A Return-Allocated Capital-Equivalence Approach for Securitisations

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This paper comments on the BCBS's proposed capital treatment for securitisations held by banks, explains why this matter is important, and suggests an alternative approach based on capital equivalence with capital allocated based on return.

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1. Executive Summary

The Basel Committee on Banking Supervision (BCBS) has published its proposal for the capital treatment of securitisations. We believe the methods set out in this proposal are overly complex, rely heavily on arbitrary minimum and maximum capital charges, use ratings and lead to perverse incentives for securitising banks. As a result this will damage the functioning of the securitisation market, which is key to importing capital and funding into the banking system, enabling new lending.

Before these capital allocations are rushed into global implementation they need to be carefully reconsidered by a wider group of bank regulators, issuers and investors and politicians to determine what effects they may have on both bank issuers and investors in securitisations, the cost and availability of credit and their impact on jobs and growth.

In line with most publicly stated regulatory goals, this paper proposes an alternative approach that is simple, does not use ratings at all, is applicable to all types of securitisation, is market based, is not pro-cyclical, has no "cliff effects", requires no advanced mathematics to understand, factors in realised losses over time and requires no judgement from regulators or bankers to determine the riskiness of each tranche.

2. Background

The capital treatment of securitisations held by banks is a minor technical aspect of financial regulation usually well below the radar of politicians, economists, central bankers and senior regulators. But the regulatory capital treatment proposed by the BCBS is likely to result in, at best, these markets failing to function properly and at worst, ceasing to exist. A wider debate to consider what is proposed and the implications for banks, new lending, jobs and growth is needed.

A consequence of the US subprime mortgage crisis and abuses in other securitisation structures (CDO squared, CPDOs, etc.) was that securitisation techniques were demonised in the media and by regulators. But properly structured, they are one of the very few alternative sources of both capital and maturity-matched funding for a banking system that is structurally short of both[1]. None of the current favourites alternatives (covered bonds, term repo, central bank funding via "retained to repo" securitisations) provide both capital and term funding to banks.

Central banks have become the largest investors in the most senior tranches of securitisations as they have provided funding to banks via "retained to repo" transactions. Since 2008, central banks have also widened the scope of their activities and expanded the type of assets eligible for their discount windows and for new liquidity rules to include certain types of securitisations. Supporting the creation of a liquid private sector market should be a key policy goal as it is needed for valuation of ongoing repos with central banks and to provide an exit for central bank balance sheets.

In order to connect the benefits of lower rates, brought by QE, to smaller corporate and consumer borrowers via the banks, the securitisation market needs to be rebuilt on a sound and sustainable basis. We consider this to be fundamental for the health of the banking system, to enable new lending to both SMEs and consumers and for economic growth and employment.

The capital treatment of securitisation determines how much capital a bank has to hold against the risks it originates, retains or invests in. Since parts of securitisations will either be retained by

originating banks or held within the banking system, either on a temporary basis while seeking end investors or as repo collateral to banks providing funding or as long term portfolio investments, it is crucial that capital ratios are not set at levels that are intended to close these markets.

Many securitisation tranches will ultimately be held outside of the banking system, by pension funds, insurance companies, hedge funds, sovereign wealth funds and by a wide range of specialist intermediaries. But each of these investor groups is very important to the economy, functioning markets and are closely linked to banks. All fund investors use banks as either a source of funding and/or as trading counterparties to distribute the securities and to provide liquidity in markets. Insurance companies will be regulated by Solvency 2 which echoes the bank capital treatment and currently also makes investing in securitisations uneconomic.

3. Comments on the BCBS Proposal

The proposed new alternative BCBS securitisation methodologies[2,3] are highly complex, result in perverse capital allocations and create strong disincentives to securitise, reducing banks' access to capital and term funding. This will suppress lending to consumers and businesses, and stifle both employment and growth.

The BCBS proposals are neither logically consistent nor "capital equivalent", as the amount of capital held against a pool of loans is not the same whether:

1. The loans are held on balance sheet by an originating bank, or
2. The same portfolio of loans is securitised and all tranches are held by bank investors.

Since the total credit risk of a pool of loans is unchanged, no matter how they are tranched, or which bank balance sheet that they are held on, this is very unusual. The fact that this "capital arbitrage free" or "capital equivalence" condition is not discussed or even considered in any of the BCBS proposals, we consider to be a major failing.

The BCBS approach sets arbitrary capital minima for the best quality assets and requires 100% capitalisation of the most junior tranches; these capital ratios have no bearing on the performance of the underlying loans or the tranches. Many of the parameters input into these highly complex mathematical models are simply assumed by the developers of the models with no empirical basis or testing whatsoever. These models are difficult to understand, may not be capable of being implemented reliably by most banks and are, at very best, extremely difficult for regulators to supervise. This creates real potential for mathematically capable banks to arbitrage the rules and the outcome is likely to increase uncertainty among investors.

Finally, as demonstrated later, the proposed new BCBS approaches create perverse incentives, as they require less capital for highly leveraged securitisations than for less leveraged ones! In summary, the models are no more than sophisticated random number generators that are more driven by assumptions than by reality.

We have not engaged here in a detailed critique of the BCBS approach, as that has been comprehensively done by others[4]. Instead the focus of this paper is presenting an alternative approach that we believe is in line with most public regulatory policy goals.

4. Introduction to Alternative Approach

We believe that the goals of any new approach to assigning capital weights to securitisations should be as follows:

I. Have no bias that either encourages or discourages securitisation compared to retaining loans on balance sheet,
II. Treat retained tranches and tranches distributed to other banks exactly the same,
III. Allocate capital to risk in a systematic and practical manner that is independent of both the originators and bank investors,
IV. Apply no arbitrary capital risk weighting minima or maxima, but base all capital on expected risk,
V. Remove ratings as a central input,
VI. Be entirely based on observable data from the market at issuance,
VII. Be simple and capable of being applied consistently to all forms of securitised structures,
VIII. Promote simplicity of securitised structures,
IX. Not create new biases against either the most senior or most junior tranches, or biases for or against "thin" or "fat" tranches, or bias in favour of more highly leveraged structures,
X. Include all risk factors (such as the maturity of each tranche) in the capital allocation process,
XI. Be consistent with a sensible and simple originators' retention policy.
XII. Remove all cliff effects and avoid pro-cyclicality.

This is not a complete list of objectives, but we expect that they will resonate with most readers.

To find a simple, elegant solution to this problem that satisfies these objectives, we need to go back to first principles: capital equivalence. This forms the central tenet of the Return-Allocated Capital-Equivalence Approach, and from this point a method for consistently re-allocating the capital assignment on the underlying assets must be found.

5. The Return-Allocated Capital-Equivalence Approach (RACE)

This alternative approach is completely agnostic on securitisation as a technique, neither promoting nor discouraging securitisation vs. holding loans on balance sheet or vs. holding securitisation tranches by banks as investors, traders or as collateral for clients.

While this approach may not be perfect, it is intended to bring a workable solution to a much maligned area of capital markets that has real importance to the credit conditions in most major economies, supporting jobs and growth, improving the liquidity of bank balance sheets while helping to provide an exit for inflated central bank balance sheets.

5.1. Capital Equivalence

The principle condition that bank regulators should consider, and that is central to the RACE Approach, is that the amount of capital required to support a pool of whole loans should be ***no more and no less*** than if the loans are retained by the originating bank or if the same portfolio of loans is tranched and all tranches are held by other banks. We term this the capital equivalence condition.

If tranching and distributing enables banks to hold ***less capital collectively*** than required for holding the same portfolio of whole loans, then a trade between banks is likely to be generated (unless the "friction costs" of tranching and distributing are greater than the differential in cost of capital required). Logically this would result in the entire banking system swapping loan portfolios with each other and the end result would be less capital held against the same underlying risk from the loans (with an increase in counterparty risk). Clearly this is not desired by bank regulators, bank depositors, investors or by policy makers. Bank shareholders, tax receipts and bank management may all benefit from such a policy – but it is clearly sub-optimal and we would argue that such arbitrage is contrary to the original purpose of bank regulation and securitisation.

Advocates of securitisation might argue for allocating less capital to the aggregate of all tranches based on the increase in liquidity and the availability of trading prices that tranches have over whole loans. However, we prefer to recognise the value of securitising (servicing, pooling, tranching, rating and distributing) in the price of the securities vs. the price of the underlying loan portfolio, not as a change in capital held against credit risk since the credit risk is based on the same underlying loans.

If the capital regime used for securitisation resulted in less capital being used to support assets than would have been the case if the loans were held by the originating bank, then it also becomes difficult to present the benefits of securitisation (choice of risk and reward to investors, new source of long term funding and capital to originating banks, greater flexibility and liquidity in balance sheet management, lower cost and increased availability of credit to consumers and SMEs who do not have direct access to the capital markets) to politicians and taxpayers who are naturally sceptical of bankers' motives.

In contrast, if the ***amount of capital required for banks to hold all the tranches in aggregate is more*** than the amount of capital required to hold the portfolio of whole loans, then there is little benefit to be gained from securitisation. At the margin some banks may have excess capital to deploy and little opportunity to do so and may therefore be active investors (even if this is rare in the current environment) and some originators may require capital and term funding (the effects of securitising and distributing portfolios of loans) and be prepared to pay a higher cost than would be strictly rational – for example after a significant loss or when other sources of capital are not available.

The capital equivalence condition states that the sum of regulatory required capital to support a series of tranches should be ***no more and no less*** than that required to support the original loan pool, for all tranches in aggregate, as the risks are close to being the same.

If the capital equivalence condition holds, then any securitisation must be economically beneficial as it represents a trade in financial assets between willing sellers and willing buyers who must gain more collectively than the friction costs of securitising and distributing (legal, rating agencies, monitoring, etc.).

5.2.Capital Allocation to Tranches

The essential issue is how to assign capital charges to each of the various tranches. Where tranches are not held by banks the assignment of capital ratios is not important, but we start

with a solution where all tranches are held by banks and then relax this constraint and see how the capital allocation is affected as non-bank investors participate.

If we know that the aggregate capital charge on all tranches must equate to the original charge that the originator would hold against the original portfolio (in order to be arbitrage free or equivalent) it is merely a matter of assigning capital ratios so that on a volume weighted basis they add up.

The most logical and market based way to do this is to use the return paid on each tranche at syndication to allocate capital risk weights.

The advantage of using the "price" (or spread above a risk free rate) is that the price function contains the best independent and measurable assessment of risk and is done by all players in the market, both those that invest and equally importantly, those that do not find the asset attractive enough. Investors take risk on the investments and collectively they set the price based on their assessment of all risk factors; maturity, waterfall structure, originator, servicer, tranche thickness, transparency, etc. If investors all have access to the same information, the distribution process and pricing are public and the result is capital equivalent then capital is effectively allocated based on risk. We recognise that there are different forms of the price function that could be used for this process of capital allocation. It is important to use a method that minimises the potential for regulatory capital arbitrage through tranching techniques. For the purposes of this paper, we have used the spread at issuance. See below for a simple worked example.

In contrast, ***using credit ratings to allocate capital*** focuses reliance on a very small group of rating agencies, none of which have significant capital at risk. It would be possible to use ratings to allocate an arbitrage free amount of capital between tranches, but if you consider this for more than a few seconds it quickly becomes clear that ratings are not well suited to this task. Furthermore, using ratings (or some other non-market based measure as a proxy for "risk") runs contrary to all we have learned about using the price function to allocate resources in the most efficient manner, and is contrary to most proposed market reform initiatives. We are not against investors using rating agencies as a third party objective indicator of credit quality but ratings should not be hardwired as the drivers of capital allocation.

The other "fashion" is for banks to be allowed to use their own "***internally generated ratings based***" approaches (IRB) to assigning capital. The main merit of this approach is that it makes no attempt to pretend that it is independent! The regulators may want to back-test the accuracy of the internal system to show how well it would have performed over previous credit cycles and validate how it is used. Of course the loan officers who made and collected on these loans may have long since moved job, employer or may have retired. The credit culture of each bank may have changed over time, so the historic loss statistics produced by each bank do not have a predictive quality and cannot be relied upon ("past performance is no guide to future performance"). In reality the IRB approach amounts to a tax on smaller banks in favour of large banks that can generate the large volume of statistics required to satisfy regulators. If the IRB approach were presented under the banner "Bank trusted to set own capital ratios" then depositors and shareholders may decide to take their money elsewhere!

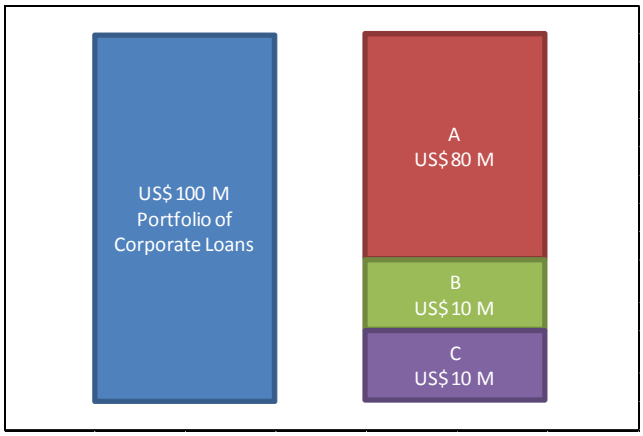
5.3.Boundary Conditions

Note that the RACE Approach has a set of simple, sensible boundary conditions;

1. no tranche can be entirely risk free and be allocated zero capital,
2. no tranche can be allocated more than 100% capital,
3. the spread must be measured relative to "risk free" securities (even if such a concept is has its own issues) and not measured against some other index, such as Libor (which is only a proxy for bank risk), and
4. any spread retained by the originator for servicing, or any excess spread used to enhance the structure, also plays an important part.

5.4.Simple Example

Consider a pool of US$ 100 M BBB corporate loans which is securitised with three classes of notes issued: Classes A, B and C, as senior, mezzanine and equity notes respectively.



The capital charge on the original loan portfolio may be determined using a standardised approach which uses the rating of the loans; in this example the BBB loans would be given a 100% risk weight. The portfolio's capital charge (K_O) would then be US$ 8 M, by multiplying the applicable risk weight (100%) by the portfolio size (US$ 100 M) and the standard Basel capital requirement (8%).

If the original loan portfolio has a weighted average spread of 100 bps over a risk-free index and if the spread over the same index on the Class A and Class B notes is observed at issuance as 40 bps and 80bps respectively, the excess spread attributable to the Class C notes can be solved for. In this case, ignoring costs and any retained excess spread, it would be 600 bps.

The capital required on the original loan portfolio can then be allocated for each of the tranches in ratio to each of their spreads above the risk-free rate such that:

$$Risk\ weight\ for\ tranche\ i\ (RW_i) = \left(\frac{Spread_i * K_O}{\sum_{i=1}^{n} Spread_i * Size_i}\right) / 8\%$$

$$K_i = Size_i * RW_i * 8\%$$

Using this process, the following risk weights and capital charges are achieved:

Portfolio	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
Original	100	100	100%	8%	8.00	8.0%

Notes	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
A	80	40	40%	8%	2.56	3.2%
B	10	80	80%	8%	0.64	6.4%
C	10	600	600%	8%	4.80	48.0%
Total	100				8.00	

This process ensures a capital equivalent allocation, where the sum of the capital required for all three tranches is equal to the capital required on the original portfolio. The allocation process has also met the boundary conditions set out above.

In summary, the observed market clearing spreads at issuance have been used to allocate US$8M capital effectively between tranches. This allocation is based on a market assessment that considers all risk factors and where no capital arbitrage or securitisation bias is possible, i.e. the process of securitising is capital neutral.

This example is more fully illustrated in Appendix 2.

5.5.Loss Adjustor Mechanism

A practical way to recognise changes in credit quality of the original loan portfolio on the credit quality of the issued tranches is to ensure that the process that the originating bank uses to recognise losses on the underlying loans is symmetrically applied to the tranches. The capital allocation can be adjusted up for each “dollar of loss” starting with the most junior tranche. See the example in Appendix 3.

Clearly this process has to be disclosed to investors up front and all regulators agree to apply the same approach as otherwise banks will rationally transfer the booking of securitised assets to jurisdictions with the most favourable capital treatment.

Standardising the process used by originating banks to recognise delinquencies and defaults and making this transparent to all (investors, rating agencies and regulators) on a regular basis improves market disclosure and keeps markets efficient. Delaying disclosure or providing incomplete disclosure only results in markets reacting to information when it is made available with price discontinuities which ultimately have adverse effects on liquidity.

5.6.Managing Capital Allocation through Time

The amortisation structure of the securitisation can change the risk profile between tranches and this should result in changes to the capital allocated through time. Similarly the returns on the underlying portfolio may change as the loan pool amortises and this will have an impact on the risk of each tranche. In all cases the capital treatment on the portfolio assets and the securitised tranches must remain equivalent. This is explained in Appendix 4.

While it might be tempting to use changes in secondary market spreads to change capital allocation through time, effectively marking-to-market capital ratios based on the changes in returns in the secondary market, (and intellectually we could support such a concept), we consider this would be a mistake because tranches are not frequently traded. Each security is unique and even with very large issue sizes trading liquidity is low and so price discovery is incomplete. (Note that there are a handful of currencies traded in deep liquid markets, a few hundred global equities issued by major corporations that are standardised and continuously

liquid, while there are hundreds of thousands of securitisation tranches each of which has unique features and which do not trade regularly.)

Changes in price therefore typically reflect changes in liquidity conditions more than changes in creditworthiness. Therefore, a mark to market capital charge would not only contribute to increased operational complexity but would also feed pro-cyclicality into capital weightings and would bring changes in liquidity perception into the capital charge as opposed to only realised changes in credit risk (2008 being a good example). However, bank investors holding securitised tranches in trading accounts would be required to mark their positions to market, which would feed through P&L into the capital base. Positions held in the banking book would not change and would stay the same as the original loan portfolio until losses are recognised.

6. Comparative Analysis of Revised BCBS Approaches and the RACE Approach

The proposed securitisation regime put forward by the BCBS fails to meet the objectives set out above.

None of the existing or proposed BCBS approaches considers an arbitrage free capital equivalence, instead the capital required, using the simple base case described in Appendix 2, ranges between total capital of 1.2 times to over 3 times the capital arbitrage free level, while the RACE Approach maintains capital equivalence. Capital ratios range between 7% (20% for new proposals) and 1,250%, and all skew capital allocated heavily towards the equity tranche.

We compared three capital structures; a base case and both a more conservative and a more highly leveraged structure, to see how capital requirement changed and to compare them to the RACE Approach. The results are shown in Appendix 5. The result is that as the capital structures become more highly leveraged all of the existing and proposed BCBS approaches require less, not more, capital! In contrast, our approach requires the same capital as the underlying loan portfolio and allocates more capital to the equity tranche as leverage is increased. Even if the numbers are not perfect the direction of travel, at least, is defensible.

Appendix 6 contains examples of actual securitisations and shows the capital allocation required for each of the existing BCBS approaches, the proposed BCBS approaches and the RACE Approach described here. As expected, none of the BCBS approaches demonstrate capital equivalence; instead a bias of 2 to 3 times as much capital as allocated to the original loan portfolio is required.

The BCBS approaches, whilst attempting to reconcile a difficult problem, contain too many fundamental flaws; one version is ratings based, all versions apply capital ratio minima on low risk senior tranches, apply mathematically generated capital allocations that bear no relation to credit risk to mezzanine tranches, apply 100% capital to first loss tranches and a maturity function that is capped at 5 years (which cannot work for ABS tranches that have legal final maturities beyond 5 years). We wonder if it is capable of being implemented consistently across banks worldwide and even then what the costs and unintended consequences may be.

In short, the BCBS methodologies impose capital allocations that bear no relation to underlying risk, create some very perverse incentives and are highly complex both to apply and to monitor. In

contrast, the RACE Approach is simple to implement, directly based on the risk of the underlying portfolio and the market cleared level of risk identified in the tranche.

7. Benefits of the RACE Approach

7.1. Meeting Objectives

The RACE Approach meets the objectives set out earlier in the paper for methods of capital allocation.

I. Have no bias that either encourages or discourages securitisation compared to retaining loans on balance sheet. ***This capital allocation proposal has no bias as capital required is equivalent, whether loans are securitised or not,***

II. Treat retained tranches and distributed tranches to other banks exactly the same. ***Capital allocation treats on balance sheet loans and loans structured into securitised tranches exactly the same,***

III. Allocate capital to risk in a systematic and practical manner that is independent of both the originators and bank investors. ***All risk factors are considered by investors in the return/price they accept,***

IV. Apply no arbitrary capital risk weighting minima or maxima but base all capital on expected risk. ***There are no arbitrary limits applied to capital allocation,***

V. Remove ratings as a central input. ***Ratings are largely removed from the capital allocation process, although they are an input to the capital allocated to the original loan portfolio,***

VI. Be entirely based on observable data from the market at issuance. ***Pricing is public and transparent and is used to allocate capital,***

VII. Be simple and capable of being applied consistently to all forms of securitised structure. ***All structures can use this approach,***

VIII. Promote simplicity of securitised structures. ***Originators will find that complexity for the sake of it cannot benefit them either at distribution or in terms of what is retained,***

IX. Not create new biases against either the most senior or most junior tranches, or biases for or against "thin" or "fat" tranches, or bias in favour of more highly leveraged structures. ***The capital allocation process has no bias,***

X. Include all risk factors (such as the maturity of each tranche) in the capital allocation process. ***Margin relative to the risk free rate is used as a best proxy for all risk factors,***

XI. Be consistent with a sensible and simple originators retention policy. ***Vertical retention is capital neutral (see below), and***

XII. Remove all cliff effects and avoid pro-cyclicality. ***There are no cliffs and no pro-cyclical tendencies as reliance on ratings is removed and there is no mark-to-market component of capital allocation.***

7.2. Information Transparency

One benefit from this approach is that the quantum of capital assigned to any investment (or retention) is clearly defined at the point of entry and so ex-post analysis of the performance of each asset is easy for management to see and understand. Similarly, concepts such as "spot return on capital" and "expected average lifetime return on capital" are easy to calculate and

report to bank portfolio managers through time as cash flows are received and any losses are realised. This should help portfolio managers make better investment decisions in future and assign appropriate capital to new investments. Transparency of this information also helps regulators and central banks when monitoring and supervising banks.

7.3.Capital within Banking System

Regulatory capital charges will always be neutral ***if all tranches are sold to banks***, ensuring that securitisation has a neutral effect on overall bank capital across the entire system. The benefits from securitising are the efficiency gains that different banks can achieve.

- Originating banks gain by selling the risk on loan assets, raising capital and term funding at a lower cost than raising traditional capital and funding.
- Originating banks are able to leverage their branch networks, systems and franchise independent of their ability to raise capital and term funding,
- Investing banks gain by being able to diversify their portfolios in the type of risk they want to hold, by asset type, industry, geography and seniority.

This situation improves ***as non-banks invest*** in securitised tranches.

- Originators have access to a wider range of investors allowing the costs of capital and maturity matched funding to reduce and the effective liquidity of banks' balance sheets to improve.
- Investors of many different types are able to select the combination of risk and return that most suits their portfolio, without originators distorting structures against them.
- Investors collectively provide lower cost and increased availability of capital and term funding allowing banks to pass on improved terms to consumer and SME borrowers.

Effectively, this is the economic gain that comes from specialisation (the famous example is of Adam Smith's pin factory) taking place inside the process of credit creation. Specialists invest in their own skills and processes and the consequence is a free trade in financial assets that lowers the cost of capital and term liquidity to bank originators and so ultimately lowers the cost and increases the availability of credit to consumers and SMEs. We view this process of credit creation as similar to just-in-time manufacturing; the combination of free markets and information technology has enabled new ways to make things at lower cost, in this case manufacturing credit, that was not possible previously.

By selling some tranches to non-banks at higher prices/lower returns then capital charges on the tranches retained by bank investors will be increased. Not only does this bring new alternatives to capital and term funding into the banking system, but the more that tranches are distributed outside the banking system the higher capitalised those tranches that remain must be, increasing the resilience of the overall banking system.

Since the amount of capital required to be held by an originating bank and by banks holding all tranches is the same, what happens if any amounts of any tranches are sold to non-bank investors? Will this increase or decrease the capital held by banks against those parts still held within the banking system?

If non-banks invest in a tranche at lower returns than banks would accept then the capital required by the other tranches that banks may invest in increases – including for the percentage retained by the originator. So while the originator has to hold the same amount of capital against the retained vertical %, irrespective of which types of investor buys which tranches, the banks that invest in tranches will hold a higher amount of capital due to the demand for other tranches from non-banks at tighter margins above the risk free rate. This process not only brings new capital into the banking system, and diversifies risk out of the banking system but also contributes to a better capitalised system for the risk that is retained within the banking system. See Appendix 7 for an example.

8. Risk Retention

Having resolved how to allocate capital to each tranche, we must also ensure that originators do not create conflicts with investors when distributing tranches and that the economics are not skewed in favour of a tranche (or tranches) in which the originator has a higher level of retention (a common trick). There are various proposed solutions to this issue, three of which are;

1. a regulatory requirement of a common percentage of vertical retention across all tranches, which we consider the preferable solution,
2. a requirement to hold a position in the first loss tranche, or
3. a requirement to hold a vertical retention across all tranches and an excess concentration in the first loss tranche. This represents a combination of 1 & 2 above and is included in the Dodd-Frank position.

8.1. Vertical Retention

The possibility for conflict between the loan portfolio originator and the buyers of the tranches exists. These conflicts are best resolved if the originator is required to hold a vertical slice of the loan portfolio in the same form as the tranches sold to end investors. The percentage retained must be the same for all tranches and can logically vary from 0% (i.e. no retention – which exposes the end investors to maximum possible conflict with the originator) to 100% (in which case no risk is sold by the originator and hence there can be no conflict), but would typically be 5%-25%. As long as the originator holds the same percentage of each tranche it must be a "fair trade" as there is no advantage to him of skewing the return in favour of any tranches. An example is shown in Appendix 8.1.

The easiest way to determine the retention % is to allow buyers in each tranche to negotiate at the point of initial distribution so that the market clears both price/return and retention percentage. The syndication process can resolve pricing and this can result in changes to the relative size of tranches, so it can easily resolve the retention percentage too. For example, if investors bidding for the most senior tranche request 5% retention while the more junior tranches require, say, 15% retention the returns and retention will be adjusted during the syndication process until the market clears at a level of retention between 5% and 15%.

It would be logical for a loan portfolio and the vertical tranches retained from the securitisation of an identical loan portfolio to have the same capital requirement or capital equivalence. None of the BCBS proposals require this; the retained tranches are not required to be a vertical slice

nor are the capital requirements equivalent. With vertical retention, the originator will be indifferent to changes in the relative size of each tranche (in terms of capital required) as the % of the original loan portfolio that is retained with vertical retention always has identical capital treatment to the original loan portfolio. Regulators should find this identity compelling when supervising originating banks.

8.2. Regulators and Vertical Tranching

Regulators will undoubtedly want to impose a minimum fixed retention in anticipation of a future market failure (and already have in some jurisdictions), and any such minima will sometimes be greater than investors require and sometimes less. The 5% retention proposed by Dodd-Frank and Article 122a is one example of this and the concept of requiring originators to hold 5% of the equity tranche is another (we believe misguided) attempt to resolve a potential for conflict that can be dealt with using the simple market mechanism set out in 4.1 above.

An alternative (and most likely less damaging) form of regulatory intervention can be achieved by supervisors monitoring retention levels, concentrations of investment positions at each level in the capital structure and both reviewing and discussing bank investor behaviour through the supervisory process as opposed to imposing standard retention percentages.

Regulators have historically not concerned themselves about conflicts between investors in different tranches, even when one or more tranches is retained by the originator, and have allowed the market to clear. This seems the most sensible way to allocate assets between competing buyers and should not be changed, apart from the requirement that originators retain a common vertical percentage of each tranche, as previously originators regularly structured tranches to be retained that benefitted from excess returns – effectively making the trade less attractive to holders of other tranches.

9. Capital Charge against the Underlying Assets

Our own opinions aside, the RACE Approach is indifferent to which method of capital charge is applied to the underlying assets. Whichever process a regulator uses to assign capital, standardised approach or internal ratings based approach, will result in a total capital charge for the underlying assets that is simply carried across through the capital equivalence condition.

Similarly, if there is a change in the regulatory capital treatment of the underlying assets at a point in time, this change can be immediately reflected in the securitised tranches by using the market-allocation method.

10. Conclusion

The central tenet of the RACE Approach is capital equivalence: that the amount of capital required to support a pool of underlying assets is the same as the total capital required against securitised tranches backed by the same underlying asset pool. The RACE Approach to capital allocation, with capital levels set by market pricing, is made into a complete solution by requiring vertical retention. With this requirement, at a retention percentage set by the market, it is simple enough to be practically applied and will prevent most forms of abuse. Originators cannot create fictional value by securitising and there can be no gains for banks to simply swap tranches of loan portfolios with

other banks. We believe that this approach is in line with regulators' goals and makes supervision easier.

The RACE Approach removes reliance on rating agencies from the capital allocated to securitisations. This is a stated goal of almost all regulators, central banks and politicians in all major financial centres. Ratings were never created for this purpose; they serve a useful function as an independent third party, expert credit opinion only.

Avoiding mark to market on capital ratios reduces any tendency to pro-cyclicality and keeps liquidity risk, the dominant factor in pricing for the most high quality tranches, out of the capital allocation process. This may not be perfect, but if delinquencies and losses on loans are reported in a sufficient and timely basis the changes in capital allocation provide an adequate solution that mirrors the underlying original loan portfolio.

Securitisation markets are an important source of capital and long term funding for the banking system. As a financing tool it allows for an increase in lending capacity to consumers and SMEs, and liquefies securities markets and bank balance sheets. Maintaining an efficient and functioning market is therefore important.

We propose a re-evaluation of the BCBS proposed securitisation approach. This should include regulators and supervisors, securitising banks and non-banks, bank and non-bank investors, central banks and public policy makers. The goals should be to consider the expected effects of the BCBS proposals and the alternative RACE Approach discussed here on the cost and availability of credit to the real economy, the likely effects on growth and employment, the effects on monetary policy, and on the liquidity of bank and central bank balance sheets. This should occur before the revised BCBS approach is implemented.

11. Notes

1. See the IMF's Global Financial Stability Report, October 2012
2. Glossary of the new approaches can be found in Appendix 1.
3. Basel Committee on Banking Supervision Revisions to the Basel Securitisation Framework http://www.bis.org/publ/bcbs236.pdf, Working paper No. 22, Foundations for the Proposed Modified Supervisory Formula Approach and Working paper http://www.bis.org/publ/bcbs_wp22.htm and No. 23, The Proposed Revised Ratings Based approach. http://www.bis.org/publ/bcbs_wp23.htm
4. Bank of America Merrill Lynch: "Killing me softly, Basel?" 28th February 2013; Deutsche Bank "Tougher Basel III Proposal puts CMBS and ABS at risk" 27th February 2013.
5. We do not attempt to determine if the capital required for the original loan portfolio is correct or not as that is another subject outside the narrow scope of this paper. Clearly capital must be sufficient to compensate for risk over the economic cycle. Banks and investors that hold too little capital for the credit risks they take (either as portfolios of whole loans or as securitised tranches) will suffer and ultimately fail. The long term effects of mispricing the risk taken by investors will be reflected in their net returns over a series of credit cycles.

6. We note that many asset types require credit ratings from third party ratings agencies (Standardised Approach) or from internally generated and back tested ratings (Internal Ratings Based) to allocate capital to the original loan portfolio. These processes are simple and do not use advanced mathematics. It seems strange to apply sophisticated math to such basic underlying credit processes.
7. Assessment of credit risk is borne by each lender individually and allocation of capital should be done at the firm level, independent of that required by regulators. For example, management of a portfolio concentrated in an industry, or geography or risk type, should reasonably add prudential capital over that required by regulation and communicate this to depositors and shareholders. We view regulatory capital requirements as a minimum standard, not something that should be managed to barely comply with.
8. Credit ratings do not carry any responsibility for determining capital allocation. Credit ratings can safely be returned to their previous role, of an informed credit opinion by an independent third party analyst whose analysis is usually well researched and of a high quality.
9. For the purpose of this analysis what non-banks do is not important. However, in the real world, if non-banks choose to follow bank regulation, then it is important.

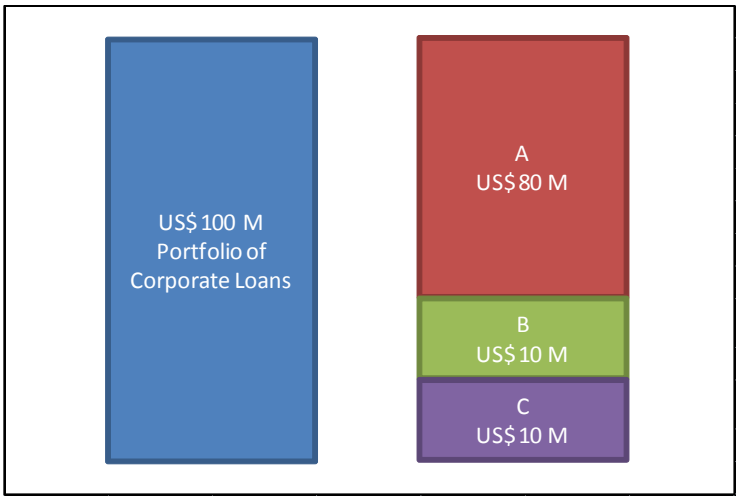
Appendices

1 Glossary

BCRA:	Backstop Concentration Ratio Approach
IRB:	Internal Ratings-Based approach
MSFA:	Modified Supervisory Formula Approach
RACE:	Return-Allocated Capital-Equivalence Approach
RRBA:	Revised Ratings-Based Approach
SA:	Standardised Approach
SSFA:	Simplified Supervisory Formula Approach

2 Simple Example: 3 tranche structure – Full capital structure issued

Consider a pool of US$ 100 M BBB corporate loans which is securitised with three notes issued; Classes A, B and C, as senior, mezzanine and equity notes respectively.



The capital charge on the original loan portfolio may be determined using a standardised approach which uses the rating of the loans; in this example the BBB loans would be given a 100% risk weight. The capital charge would then be US$ 8 M using the formula below:

$$K_O = Size_O * RW_O * 8\%$$

Where,

$$K_O = Capital\ Requirement\ on\ Original\ Portfolio$$
$$Size_O = Size\ of\ the\ Original\ Portfolio$$
$$RW_O = Standardised\ Risk\ Weight\ of\ the\ Original\ Portfolio$$
$$8\% = Basel\ capital\ requirement$$

So,

$$K_O = US\$\ 100\ M * 100\% * 8\% = US\$\ 8\ M$$

If the original loan portfolio has a weighted average spread of 100bps over a risk-free index and if the spread over the same index on the Class A and Class B notes is observed at issuance, the excess spread attributable to the Class C notes can be calculated, ignoring costs and any retained excess spread, using the formula:

$$Spread_C = \big((Size_O * Spread_O) - [(Size_A * Spread_A) + (Size_B * Spread_B)]\big)/Size_C$$

Assuming that $Spread_A = 40bps$ and $Spread_B = 80bps$ then $Spread_C$ is calculated as $600bps$. The weighted average spread for the original loan portfolio and the spread observed at issuance for each of the tranches is shown below:

	Size ($M)	Spread (bps)
Portfolio	100	100

Notes	Size ($M)	Spread (bps)
A	80	40
B	10	80
C	10	600

The capital required on the original loan portfolio can then be allocated for each of the tranches in ratio to each of their spreads above the risk-free rate such that:

$$RW_i = \left(\frac{Spread_i * K_O}{\sum_{i=1}^{n} Spread_i * Size_i} \right) / 8\%$$

$$K_i = Size_i * RW_i * 8\%$$

This will give the following risk weights and capital charges:

Portfolio	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
Original	100	100	100%	8%	8.00	8.0%

Notes	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
A	80	40	40%	8%	2.56	3.2%
B	10	80	80%	8%	0.64	6.4%
C	10	600	600%	8%	4.80	48.0%
Total	100				8.00	

This process ensures a capital equivalent allocation, where the sum of the capital required for all three tranches is equal to the capital required on the original portfolio:

$$K_O = \sum_{i=1}^{n} K_i$$

It can be seen that the boundary conditions set out in the proposal have been satisfied, as:

- The notional capital charge on a tranche is always greater than 0 ($K_i > 0$)
- The notional capital charge on a tranche is always:
  - Less than the notional capital charge on the original loan pool ($K_i < K_O$)
  - Less than or equal to the size of the tranche ($K_i \leq Size_i$).

In summary, the observed market clearing spreads at issuance have been used to allocate US$ 8 M capital effectively between tranches. This allocation is based on a market assessment that considers all risk factors and where no capital arbitrage or securitisation bias is possible, i.e. the process of securitising is capital neutral.

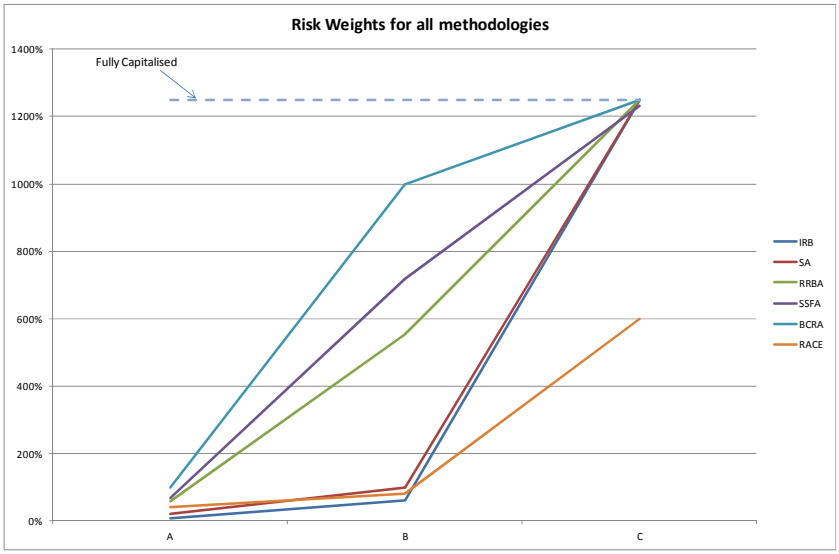
When comparing the capital requirements for each of the classes of notes using the current ratings based approaches, the BIS proposed methods and the RACE proposal, the following simplifying assumptions were made:

- The notes all fall in the five-year maturity bucket (maturity is a required input for the RRBA)
- The ratings are AAA for the Class A notes and BBB for the Class B notes as shown in the table below
- The underlying capital charge on the loan portfolio is 100%
- There are no 90 days + delinquencies or defaults

The table below demonstrates the required capital for individual tranches under the IRB RBA, Standardised RBA, RRBA, SSFA, BCRA and RACE approaches. The MSFA approach has not been used as the outputs depend on a bank's internal model and so the results will vary. Also shown is the total capital across the entire capital structure.

Notes	Size ($M)	Ratings	IRB		SA		RRBA		SSFA		BCRA		RACE	
			RW %	Cap $	RW %	Cap $	RW %	Cap $	RW %	Cap $	RW %	Cap $	RW %	Cap $
A	80	AAA	7%	0.45	20%	1.28	58%	3.71	69%	4.41	100%	6.40	40%	2.56
B	10	BBB	60%	0.48	100%	0.80	553%	4.43	718%	5.74	1000%	8.00	80%	0.64
C	10	NR	1250%	10.00	1250%	10.00	1250%	10.00	1230%	9.84	1250%	10.00	600%	4.80
Total Capital Charge ($M)				10.93		12.08		18.14		19.99		24.40		8.00
Multiple of loan pool charge				1.37		1.51		2.27		2.50		3.05		1.00

The chart below shows the risk weight percentages for each tranche under the approaches.

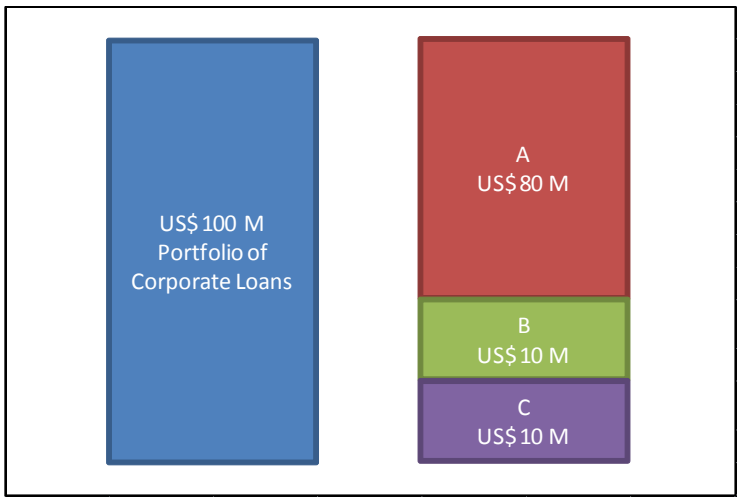


It can be seen that, in this illustrative example, the risk weight for the senior tranche is higher under the RACE approach than it is under the existing RBA approaches and lower towards the junior part of the capital structure. In all cases, it has a lower total capital charge than the other approaches as it maintains capital equivalence whereas the other approaches largely fully capitalise the Class C notes (The SSFA has 1,230% for the Class C).

The results across tranches would vary, however, depending on the market's perceived level of risk for different transactions. For example, should the market perceive the senior notes to have lower risk, the Class A spread would be lower and the capital allocated to the senior notes would decrease while the allocation to the junior notes increased.

3 Applying losses

Now consider the change in capital charges as the original loan portfolio starts to suffer losses. Consider a loss of US$ 5 M, which is lower than the capital charge on the original loan portfolio, and on across all tranches, of US$ 8 M. It is then assumed that losses rise above this level and above the size of the Class C tranche. The original portfolio and class charges are given below:



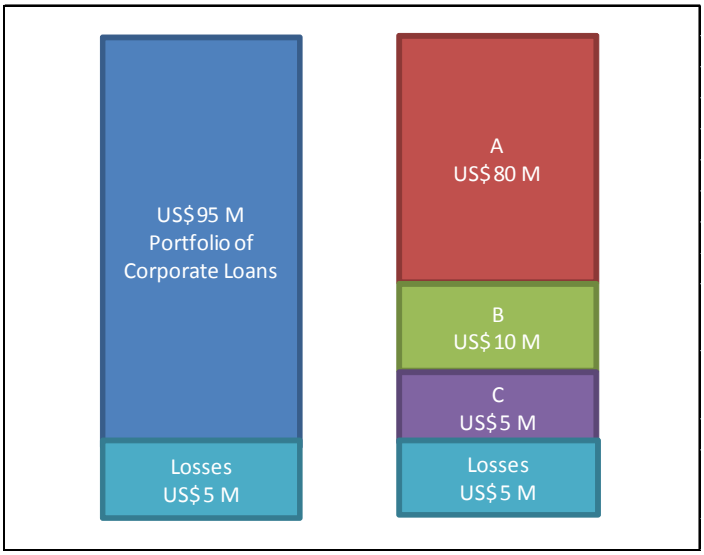
Returning to the securitisation of a BBB corporate portfolio:

Portfolio	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
Original	100	100	100%	8%	8.00	8.0%

Notes	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
A	80	40	40%	8%	2.56	3.2%
B	10	80	80%	8%	0.64	6.4%
C	10	600	600%	8%	4.80	48.0%
Total	100				8.00	

i. US$ 5 M loss

If the portfolio suffered US$ 5 M of losses, these would be allocated to the Class C notes, the first loss tranche.



As losses are fully capitalised, once the portfolio has suffered US$ 5 M of loss, the capital charge levied on the portfolio (on an un-securitised basis) and the charges on the securitised tranches would both be updated to maintain capital equivalence at US$ 12.6 M as follows:

	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
Portfolio	95	100	100%	8%	7.60	8.0%
Losses	5	100	1250%	8%	5.00	100.0%
Total	100				12.60	12.6%

Notes	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
A	80	40	54%	8%	3.47	4.3%
B	10	80	109%	8%	0.87	8.7%
C	5	600	814%	8%	3.26	65.1%
C - losses	5	600	1250%	8%	5.00	
Total	100				12.60	

Note that a risk weight of 1,250% is equivalent to a full capitalisation. Although the spreads on Classes A, B and C remain unchanged, the risk weights have increased as the protection provided by the equity tranche has been eroded through losses. The proposed approach therefore ensures that capital allocations reflect the increased risk presented by the realised credit deterioration.

ii. US$ 15 M loss

Once the portfolio has suffered US$ 15 M of loss, the Class C notes would effectively be fully written off and the Class B notes would be partially written off. The capital charge levied on the portfolio (on an un-securitised basis) and the charges on the securitised tranches would be updated as follows:

	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
Portfolio	85	100	100%	8%	6.80	8.0%
Losses	15	100	1250%	8%	15.00	100.0%
Total	100				21.80	21.8%

Notes	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
A	80	40	94%	8%	6.04	7.6%
B	5	80	189%	8%	0.76	57.6%
B - losses	5	80	1250%	8%	5.00	
C - losses	10	600	1250%	8%	10.00	100%
Total	100				21.80	

The risk weights on the three tranches have been re-calculated, by using actual losses and the tranche spreads at issuance, in order to distribute the remaining US$ 6.8 M capital charge from the performing section of the portfolio amongst them. The further increase in losses has resulted in a substantial increase in the risk weights at the senior end, reflecting the worsening credit and reduced credit enhancement.

iii. US$ 25 M loss

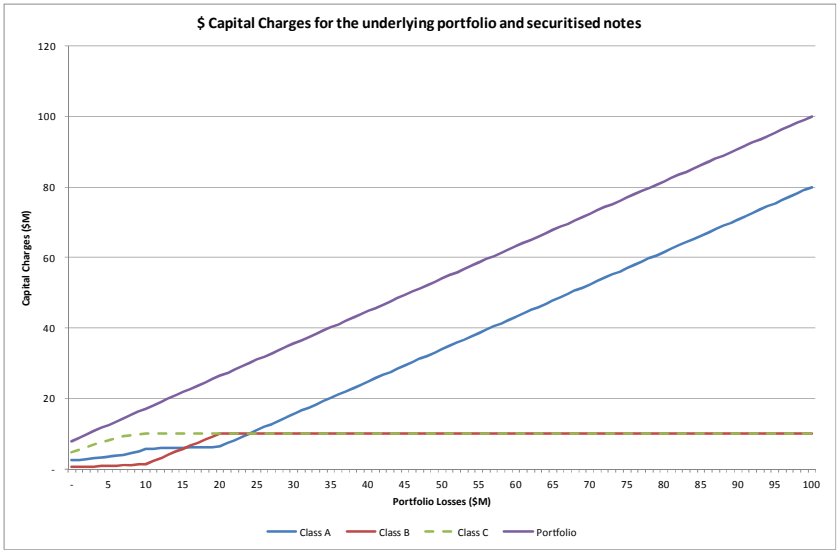
Once the portfolio has suffered US$ 25 M of loss levied on the portfolio (on an un-securitised basis) the charges on the securitised tranches would updated as follows:

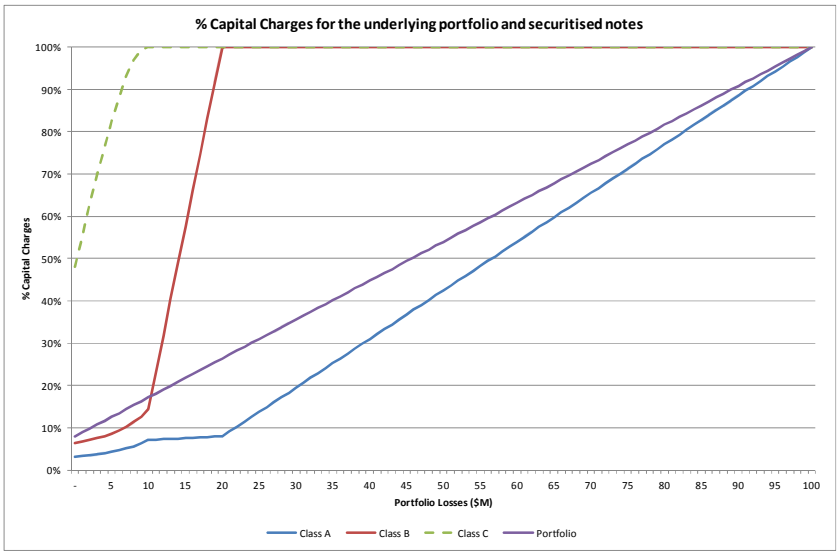
	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
Portfolio	75	100	100%	8%	6.00	8.0%
Losses	25	100	1250%	8%	25.00	100.0%
Total	100				31.00	31.0%

Notes	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
A	75	40	100%	8%	6.00	13.8%
A - losses	5	40	1250%	8%	5.00	
B - losses	10	80	1250%	8%	10.00	100.0%
C - losses	10	600	1250%	8%	10.00	100.0%
Total	100				31.00	

The Class B and C notes would be fully capitalised, to reflect the total loss to these tranches, and the remaining US$ 6 M of capital would be allocated to the performing part of the Class A notes. The Class A note bears all the credit risk of the remaining portfolio and should therefore, by maintaining capital equivalence, hold the same capital as if the portfolio were held by the bank on an un-securitised basis.

The charts below demonstrate the effects of these increasing portfolio losses on the capital allocation across tranches. The first chart shows how the notional capital charges on each of the tranches change as losses in the portfolio rise and the second chart shows these capital charges on a percentage basis.

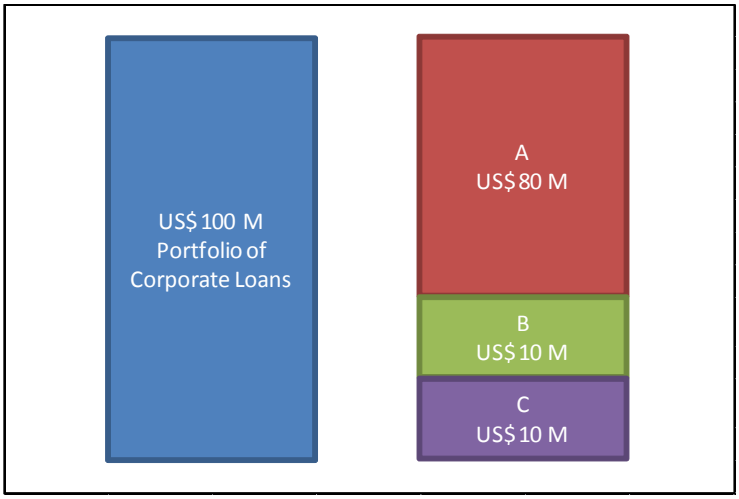




This approach ensures that as losses and capital charges rise on the original loan portfolio they will also rise on the securitised notes, ensuring that increased risk is represented in increased capital. The notional capital charge is capped at the size of each tranche and the total notional charge on the securitised notes is always equal to the notional charge on the loan portfolio, maintaining the capital equivalence condition.

4 Amortisation

With principal receipts, issued notes will amortise down over time either in a pro-rata or sequential fashion. The amortisation will change the capital structure make-up and have implications for required levels of capital. Both methods are considered to see the impact on the capital charges. The original portfolio and securitised notes are shown below:



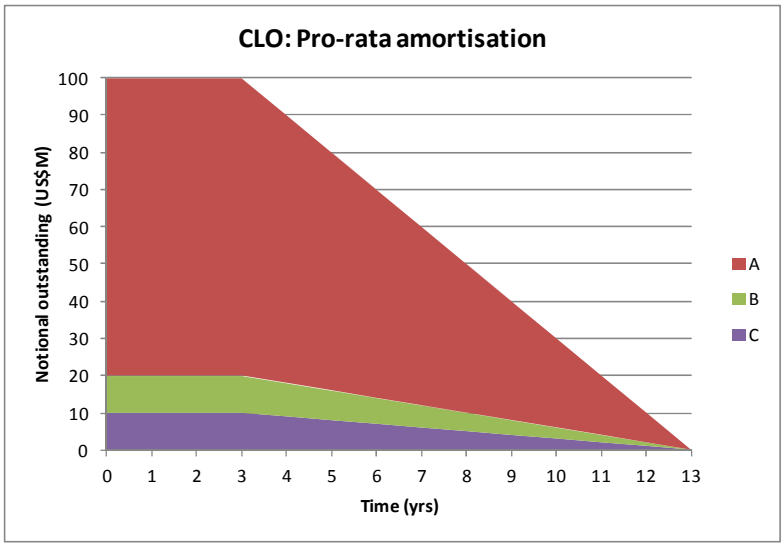
Using the example of a securitisation of BBB corporate loans:

Portfolio	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
Original	100	100	100%	8%	8.00	8.0%

Notes	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
A	80	40	40%	8%	2.56	3.2%
B	10	80	80%	8%	0.64	6.4%
C	10	600	600%	8%	4.80	48.0%
Total	100				8.00	

4.1 Pro-rata pay down

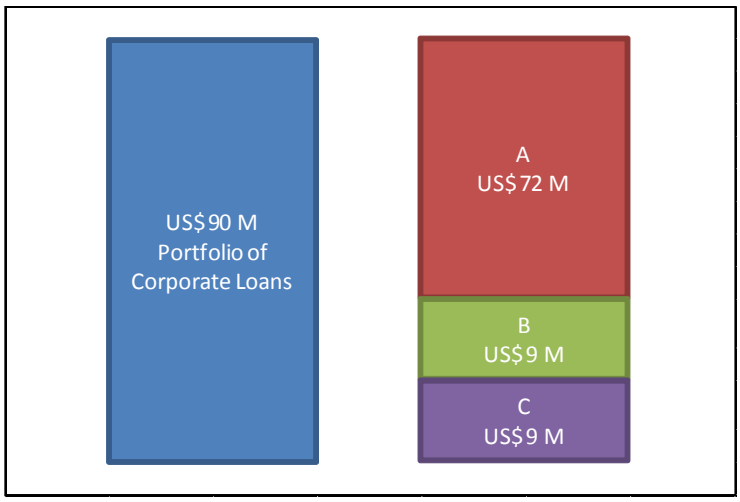
Now assuming that the structure allocates principal receipts to all three notes on a pro-rata basis. Suppose the securitisation had a 3-year revolving period followed by this pro-rata amortisation. The paydown profile could be represented by the chart below:



Below is an examination of how the capital structure and capital required alter with increasing levels of principal pay down.

(i) US$ 10 M paydown leaving US$ 90 M outstanding:

At the first principal payment date post the reinvestment period, US$ 10 M of principal is paid down, which is distributed among the notes in proportion to their sizes. It is assumed at this stage that there have been no losses or delinquencies to the portfolio. The outstanding loan portfolio and securitised notes, after this pay down, are shown below:



Under a pro-rata pay down the risk weights remain unchanged, as can be seen in the table below.

	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
Portfolio	90	100	100%	8%	7.20	8.0%

Notes	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
A	72	40	40%	8%	2.30	3.2%
B	9	80	80%	8%	0.58	6.4%
C	9	600	600%	8%	4.32	48.0%
Total	90				7.20	

The total amount of capital required has also reduced by 10%. It can be seen from the cases below, that each paydown results in the same proportionate reduction in capital required.

(ii) US$ 40 M paydown leaving US$ 60 M outstanding:

	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
Portfolio	60	100	100%	8%	4.80	8.0%

Notes	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
A	48	40	40%	8%	1.54	3.2%
B	6	80	80%	8%	0.38	6.4%
C	6	600	600%	8%	2.88	48.0%
Total	60				4.80	

(iii) US$ 60 M paydown leaving US$ 40 M outstanding:

	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
Portfolio	40	100	100%	8%	3.20	8.0%

Notes	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
A	32	40	40%	8%	1.02	3.2%
B	4	80	80%	8%	0.26	6.4%
C	4	600	600%	8%	1.92	48.0%
Total	40				3.20	

(iv) US$ 70 M paydown leaving US$ 30 M outstanding:

	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
Portfolio	30	100	100%	8%	2.40	8.0%

Notes	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
A	24	40	40%	8%	0.77	3.2%
B	3	80	80%	8%	0.19	6.4%
C	3	600	600%	8%	1.44	48.0%
Total	30				2.40	

(v) US$ 80 M paydown leaving US$ 20 M outstanding:

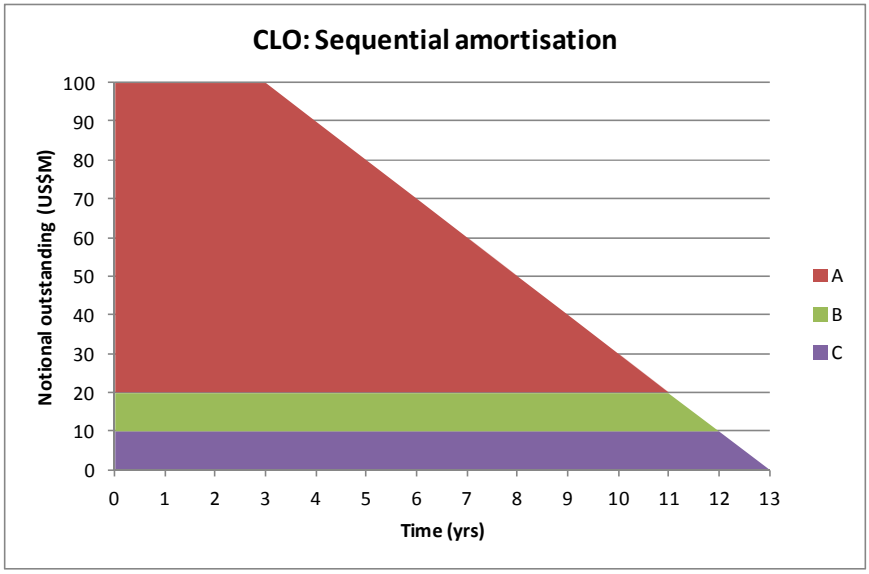
	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
Portfolio	20	100	100%	8%	1.60	8.0%

Notes	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
A	16	40	40%	8%	0.51	3.2%
B	2	80	80%	8%	0.13	6.4%
C	2	600	600%	8%	0.96	48.0%
Total	20				1.60	

Note that the risk weights and the capital percentages are stable through time. If the issuer had retained a vertical slice the capital charge on their retained holdings would decrease in line with the paydowns and the percentage capital charge would remain the same.

4.2 Sequential paydown

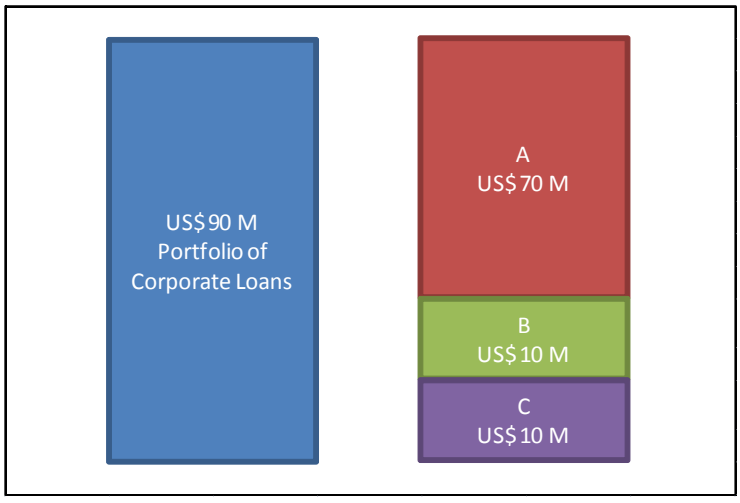
Suppose that the securitisation used in the first example had a 3-year revolving period followed by the sequential amortisation of issued notes. In this type of structure, the pay down profile would be represented by the chart below:



Below is an examination of how the capital structure and capital required alter with increasing levels of principal pay down.

(i) US$ 10 M paydown:

At the first principal payment date post the reinvestment period, US$ 10 M of principal is paid to the Class A notes to reduce their outstanding balance. Again, it is assumed that there have been no losses on the portfolio and there are no delinquencies. The outstanding loan portfolio and securitised notes are shown below:



The capital charge for the underlying portfolio (on an un-securitised basis) has reduced by 10% to US$ 7.2 M in line with the reduction in portfolio size. The resulting capital charges for each of the tranches are given below.

	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
Portfolio	90	100	100%	8%	7.20	8.0%

Notes	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
A	70	40	40%	8%	2.24	3.2%
B	10	80	80%	8%	0.64	6.4%
C	10	540	540%	8%	4.32	43.2%
Total	90				7.20	

The risk weights to Classes A and B are unchanged, but the notional amount of capital to Class A has reduced in line with the reduction in class size. As the size of the Class C note has stayed constant while the portfolio size has reduced, the implied excess spread due to it has reduced, resulting in a reduction in the capital allocated to that class. The portfolio is assumed to have the same level of credit risk over time, however any change in credit risk would be reflected by a change in the portfolio's risk weight, which would be reflected pro-rata throughout the capital structure risk weights.

The pay down will have no impact on the Class B capital charge until the Class B notes begin to receive principal payments. The capital charge on the Class C notes reduces until eventually the Class A and B notes have been paid down and the capital charge equals the charge on the underlying portfolio as they then share the same notional size and credit risk. The extension of this pay down schedule is illustrated below:

(ii) US$ 40 M paydown:

	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
Portfolio	60	100	100%	8%	4.80	8.0%

Notes	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
A	40	40	40%	8%	1.28	3.2%
B	10	80	80%	8%	0.64	6.4%
C	10	360	360%	8%	2.88	28.8%
Total	60				4.80	

(iii) US$ 60 M paydown:

	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
Portfolio	40	100	100%	8%	3.20	8.0%

Notes	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
A	20	40	40%	8%	0.64	3.2%
B	10	80	80%	8%	0.64	6.4%
C	10	240	240%	8%	1.92	19.2%
Total	40				3.20	

(iv) US$ 80 M paydown:

	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
Portfolio	20	100	100%	8%	1.60	8.0%

Notes	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
A	0	40	40%	8%	-	-
B	10	80	80%	8%	0.64	6.4%
C	10	120	120%	8%	0.96	9.6%
Total	20				1.60	

(v) US$ 90 M paydown:

	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
Portfolio	10	100	100%	8%	0.80	8.0%

Notes	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
A	0	40	40%	8%	-	-
B	0	80	80%	8%	-	-
C	10	100	100%	8%	0.80	8.0%
Total	10				0.80	

If the issuer had retained a vertical slice as the notes amortised sequentially the capital charge on their retained holdings would decrease in line with the change in portfolio size and the percentage capital charge would remain stable at 8%.

5 Implications of changing the capital structure

An issuing bank will have many different permutations of tranche size to consider when securitising this portfolio. It is possible to analyse how the different risk weight approaches vary under different capital structures. With the RACE approach capital equivalence is maintained for all types of capital structure.

Continuing the example of a US$ 100 M portfolio of BBB corporate loans:

	Size	Spread	Capital
Original	100	400	8

Using three different examples, and simple assumptions on their ratings and spreads, results are shown on the table below:

Capital Structure 1					IRB		SA		RRBA		SSFA		BCRA		RACE	
	Size	CE	Spread	Rating	RW %	Cap $	RW %	Cap $	RW %	Cap $	RW %	Cap $	RW %	Cap $	RW %	Cap $
A	60	40	120	AAA	7%	0.34	20%	0.96	58%	2.78	20%	0.96	100%	4.80	30%	1.44
B	20	20	300	A	12%	0.19	50%	0.80	279%	4.46	224%	3.58	500%	8.00	75%	1.2
C	20	0	1340	NR	1250%	20.00	1250%	20.00	1250%	20.00	974%	15.59	1000%	16.00	335%	5.36
Total Capital Charge ($M)						20.53		21.76		27.25		20.13		28.80		8.00
Multiple of loan pool charge						2.57		2.72		3.41		2.52		3.60		1.00

Capital Structure 2					IRB		SA		RRBA		SSFA		BCRA		RACE	
	Size	CE	Spread	Rating	RW %	Cap $	RW %	Cap $	RW %	Cap $	RW %	Cap $	RW %	Cap $	RW %	Cap $
A	80	20	140	A	12%	0.77	50%	3.20	141%	9.00	69%	4.41	100%	6.40	35%	2.24
B	10	10	600	BB	425%	3.40	350%	2.80	360%	2.88	718%	5.74	1000%	8.00	150%	1.2
C	10	0	2280	NR	1250%	10.00	1250%	10.00	1250%	10.00	1230%	9.84	1250%	10.00	570%	4.56
Total Capital Charge ($M)						14.17		16.00		21.88		19.99		24.40		8.00
Multiple of loan pool charge						1.77		2.00		2.74		2.50		3.05		1.00

Capital Structure 3					IRB		SA		RRBA		SSFA		BCRA		RACE	
	Size	CE	Spread	Rating	RW %	Cap $	RW %	Cap $	RW %	Cap $	RW %	Cap $	RW %	Cap $	RW %	Cap $
A	85	15	150	A	12%	0.82	50%	3.40	141%	9.56	98%	6.69	100%	6.80	38%	2.55
B	10	5	700	B	1250%	10.00	1250%	10.00	360%	2.88	1038%	8.30	1250%	10.00	175%	1.4
C	5	0	4050	NR	1250%	5.00	1250%	5.00	1250%	5.00	1250%	5.00	1250%	5.00	1013%	4.05
Total Capital Charge ($M)						15.82		18.40		17.45		19.99		21.80		8.00
Multiple of loan pool charge						1.98		2.30		2.18		2.50		2.73		1.00

It can be seen from table, that under the most conservative capital structure, which has 20% equity in the form of Class C notes, that the capital charges for the existing and proposed BIS approaches all rise to over twice the capital charge on the original loan portfolio, whereas the RACE approach maintains the capital equivalence condition. Assumptions have been made on the change to ratings and spread as the capital structure changes.

When the capital structure becomes more aggressive, with less credit enhancement available to the more senior notes, the ratings based approaches result in much reduced capital requirements across the total capital structure. The same can be said of the proposed non-ratings based approaches, although to a lesser degree, whereas the RACE approach maintains capital equivalence throughout. This eliminates the potential bias currently inherent in structuring securitisations.

6 Examples using real world securitisations

6.1 UK RMBS Master Trust

Capital Structure

The capital structure for a 2006 UK Master Trust is given below:

Class	Original Rating	Orig C/E (%)	Orig Balance (Ccy)	Ccy	FX rate	Orig Balance (£)	Coupon	TED Spread	Spread over risk-free rate
A1	AAA/Aaa/AAA sf	11.62%	650,000,000	USD	0.525	341,028,332	1m USD Libor + 3bps	10.7	13.7
A2	AAA/Aaa/AAA sf	11.62%	200,000,000	EUR	0.676	135,226,504	3m EURIBOR + 4bps	20.7	24.7
A3	AAA/Aaa/AAA sf	11.62%	350,000,000	GBP	1.000	350,000,000	3m GBP LIBOR + 4bps	19.0	23.0
A4	AAA/Aaa/AAA sf	11.62%	704,300,000	USD	0.525	369,517,314	3m USD LIBOR + 5bps	33.8	38.8
A5	AAA/Aaa/AAA sf	11.62%	350,000,000	CAD	0.458	160,440,064	1m CDOR + 6.5bps	13.1	19.6
A6	AAA/Aaa/AAA sf	11.62%	1,130,000,000	USD	0.525	592,864,638	3m USD LIBOR + 9bps	33.8	42.8
A7	AAA/Aaa/AAA sf	11.62%	1,135,000,000	EUR	0.676	767,410,412	3m EURIBOR + 11bps	20.7	31.7
A8	AAA/Aaa/AAA sf	11.62%	300,000,000	GBP	1.000	300,000,000	3m GBP LIBOR + 11bps	19.0	30.0
B1	AA/Aa3/AA sf	8.37%	60,600,000	USD	0.525	31,794,334	3m USD LIBOR + 9bps	33.8	42.8
B3	AA/Aa3/AA sf	8.37%	62,500,000	EUR	0.676	42,258,283	3m EURIBOR + 19bps	20.7	39.7
M1	A/A2/A sf	5.09%	47,800,000	USD	0.525	25,078,699	3m USD LIBOR + 17bps	33.8	50.8
M2	A/A2/A sf	5.09%	10,000,000	USD	0.525	5,246,590	3m USD LIBOR + 29bps	33.8	62.8
M3	A/A2/A sf	5.09%	84,400,000	EUR	0.676	57,065,585	3m EURIBOR + 29bps	20.7	49.7
C1	BBB/Baa2/BBB sf	1.65%	32,600,000	USD	0.525	17,103,882	3m USD LIBOR + 38bps	33.8	71.8
C2	BBB/Baa2/BBB sf	1.65%	15,000,000	USD	0.525	7,869,885	3m USD LIBOR + 48bps	33.8	81.8
C3	BBB/Baa2/BBB sf	1.65%	62,800,000	EUR	0.676	42,461,122	3m EURIBOR + 48bps	20.7	68.7

As before it is assumed that when the mortgages remain on the banks' balance sheet they are given a 35% risk weighting, which would lead to a capital charge of GBP£ 90.87 M for a portfolio of GBP£ 3,245.37 M.

	Size (£)	RW	8%	Capital (£)	Capital (%)
Portfolio	3,245,365,643.48	35%	8%	90,870,238.02	2.80%

Notes	Size (£)	Spread (bps)	RW	8%	Capital ($)	Capital (%)
A1	341,028,332	14	14.87%	8%	4,056,781	1.19%
A2	135,226,504	25	26.85%	8%	2,904,449	2.15%
A3	350,000,000	23	25.00%	8%	7,000,046	2.00%
A4	369,517,314	39	42.16%	8%	12,464,062	3.37%
A5	160,440,064	20	21.34%	8%	2,738,660	1.71%
A6	592,864,638	43	46.51%	8%	22,059,866	3.72%
A7	767,410,412	32	34.46%	8%	21,153,975	2.76%
A8	300,000,000	30	32.61%	8%	7,826,139	2.61%
B1	31,794,334	43	46.51%	8%	1,183,034	3.72%
B3	42,258,283	40	43.15%	8%	1,458,839	3.45%
M1	25,078,699	51	55.21%	8%	1,107,614	4.42%
M2	5,246,590	63	68.25%	8%	286,466	5.46%
M3	57,065,585	50	54.02%	8%	2,466,242	4.32%
C1	17,103,882	72	78.03%	8%	1,067,736	6.24%
C2	7,869,885	82	88.90%	8%	559,724	7.11%
C3	42,461,122	69	74.67%	8%	2,536,607	5.97%
Total					90,870,238	

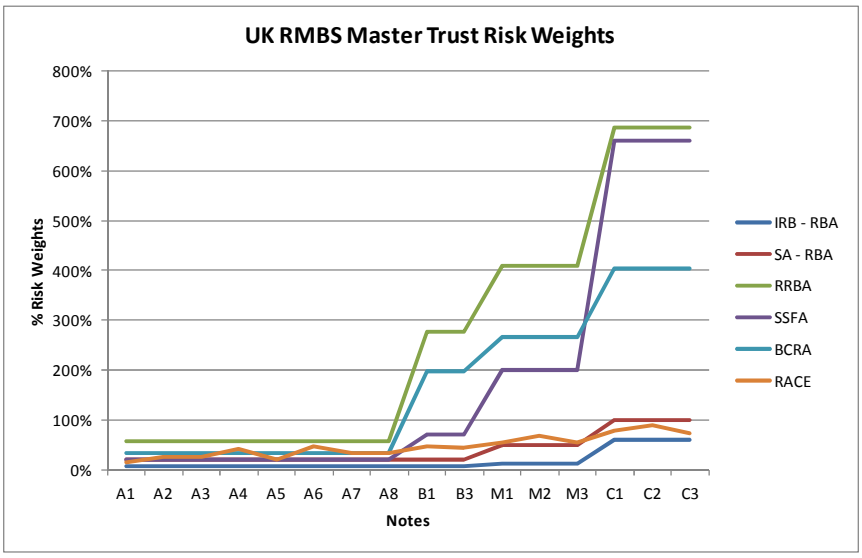
Assigned capital charges using different methodologies:

The table below compares the risk weights and capital charges under each of the methodologies. In this case the standardised RBA and the IRB RBA have lower charges than the RACE method as the junior notes are rated.

Notes	Size (£)	Ratings	IRB - RBA		SA - RBA		RRBA		SSFA		BCRA		RACE	
			RW %	Cap $	RW %	Cap $	RW %	Cap $	RW %	Cap $	RW %	Cap $	RW %	Cap $
A1	341,028,331.6	AAA	7%	1,909,759	20%	5,456,453	58%	15,821,737	20%	5,456,453	35%	9,548,793	15%	4,056,781
A2	135,226,504.4	AAA	7%	757,268	20%	2,163,624	58%	6,273,725	20%	2,163,624	35%	3,786,342	27%	2,904,449
A3	350,000,000.0	AAA	7%	1,960,000	20%	5,600,000	58%	16,237,970	20%	5,600,000	35%	9,800,000	25%	7,000,046
A4	369,517,313.7	AAA	7%	2,069,297	20%	5,912,277	58%	17,143,460	20%	5,912,277	35%	10,346,485	42%	12,464,062
A5	160,440,064.2	AAA	7%	898,464	20%	2,567,041	58%	7,443,488	20%	2,567,041	35%	4,492,322	21%	2,738,660
A6	592,864,638.0	AAA	7%	3,320,042	20%	9,485,834	58%	27,505,481	20%	9,485,834	35%	16,600,210	47%	22,059,866
A7	767,410,412.4	AAA	7%	4,297,498	20%	12,278,567	58%	35,603,392	20%	12,278,567	35%	21,487,492	34%	21,153,975
A8	300,000,000.0	AAA	7%	1,680,000	20%	4,800,000	58%	13,918,260	20%	4,800,000	35%	8,400,000	33%	7,826,139
B1	31,794,333.7	AA	8%	203,484	20%	508,709	276%	7,024,670	70%	1,782,373	198%	5,043,860	47%	1,183,034
B3	42,258,282.6	AA	8%	270,453	20%	676,133	276%	9,336,584	70%	2,368,977	198%	6,703,864	43%	1,458,839
M1	25,078,698.8	A	12%	240,756	50%	1,003,148	410%	8,215,807	200%	4,017,976	267%	5,360,333	55%	1,107,614
M2	5,246,589.7	A	12%	50,367	50%	209,864	410%	1,718,788	200%	840,581	267%	1,121,408	68%	286,466
M3	57,065,584.9	A	12%	547,830	50%	2,282,623	410%	18,694,743	200%	9,142,745	267%	12,197,224	54%	2,466,242
C1	17,103,882.5	BBB	60%	820,986	100%	1,368,311	687%	9,400,883	661%	9,039,255	405%	5,536,517	78%	1,067,736
C2	7,869,884.6	BBB	60%	377,754	100%	629,591	687%	4,325,560	661%	4,159,166	405%	2,547,477	89%	559,724
C3	42,461,122.4	BBB	60%	2,038,134	100%	3,396,890	687%	23,338,095	661%	22,440,339	405%	13,744,641	75%	2,536,607
Total Capital Charge (£M)				21,442,093		58,339,064		222,002,643		102,055,209		136,716,967		90,870,238
Multiple of loan pool charge				0.24		0.64		2.44		1.12		1.50		1.00

Chart of capital requirements:

The charts below demonstrate the distribution of risk weights and capital charges under each of the methodologies.



6.2 US CLO

Capital Structure

The capital structure for a 2012 US CLO is given below.

Tranches	Rating	Size ($)	Spread	TED Spread	Spread over risk-free rate
A-1	AAA	372,000,000	3m USD LIBOR + 137	23	160
A-2	AA	75,000,000	3m USD LIBOR + 225	23	248
B	A	47,400,000	3m USD LIBOR + 315	23	338
C	BBB	28,800,000	3m USD LIBOR + 450	23	473
D	BB	28,800,000	3m USD LIBOR + 525	23	548
Equity	NR	58,150,000	-	-	-

If the loans were to remain on the banks' balance sheet, under the standardised approach, they would be assigned a capital charge based on their current ratings. The ratings breakdown for the current portfolio is given below along with the specified risk weights; the weighted average risk weight is 141.86%.

Rating	CQS	Target portfolio	Risk Weight
AAA	1	0.00%	20%
AA+	1	0.00%	20%
AA	1	0.00%	20%
AA-	1	0.00%	20%
A+	2	0.00%	50%
A	2	0.00%	50%
A-	2	0.00%	50%
BBB+	3	0.00%	100%
BBB	3	0.00%	100%
BBB-	3	0.00%	100%
BB+	4	0.16%	100%
BB	4	2.62%	100%
BB-	4	13.50%	100%
B+	5	27.88%	150%
B	5	32.60%	150%
B-	5	20.26%	150%
CCC+	5	0.00%	150%
CCC	5	0.51%	150%
CCC-	5	2.47%	150%
CC	5	0.00%	150%

This would lead to a capital charge of US$ 69 M on the US$ 610 M loan portfolio.

Portfolio	Size ($)	Spread (bps)	RW	8%	Capital ($)	Capital (%)
Original	610,150,000	399	141.86%	8%	69,244,703	11.35%

It is assumed that all excess spread is given to the equity notes, again making the simplifying assumption that there are no fees or expenses. And so the US$ 69 M capital charge would be allocated to the notes as shown below:

Notes	Size ($)	Spread (bps)	RW	8%	Capital ($)	Capital (%)
A-1	372,000,000	160	56.77%	8%	16,895,479.07	4.54%
A-2	75,000,000	248	88.06%	8%	5,283,591.70	7.04%
B	47,400,000	338	120.06%	8%	4,552,612.93	9.60%
C	28,800,000	473	168.06%	8%	3,872,012.60	13.44%
D	28,800,000	548	194.72%	8%	4,486,383.72	15.58%
Equity	58,150,000	2,065	734.19%	8%	34,154,623.18	58.74%
Total	610,150,000				69,244,703.20	

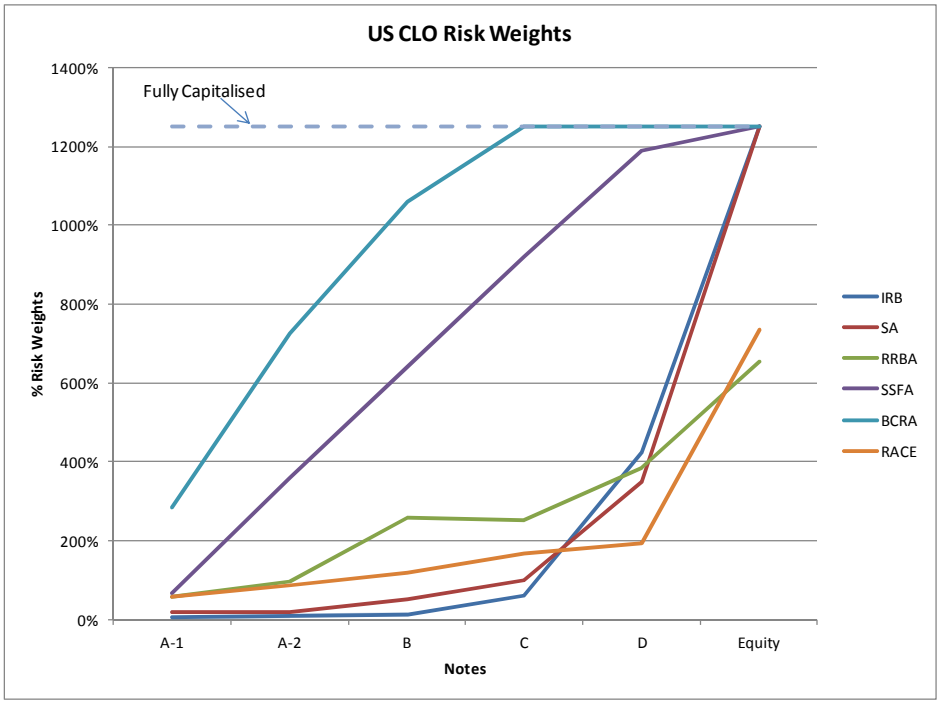
Assigned capital charges using different methodologies

The table below compares the risk weights and capital charges under each of the methodologies.

Notes	Size ($)	Ratings	IRB		SA		RRBA		SSFA		BCRA		RACE	
			RW %	Cap $	RW %	Cap $	RW %	Cap $	RW %	Cap $	RW %	Cap $	RW %	Cap $
A-1	372,000,000	AAA	7%	2,083,200	20%	5,952,000	58%	17,258,642	67%	19,868,058	284%	84,444,000	57%	16,895,479
A-2	75,000,000	AA	8%	480,000	20%	1,200,000	97%	5,823,342	361%	21,632,633	727%	43,620,292	88%	5,283,592
B	47,400,000	A	12%	455,040	50%	1,896,000	258%	9,787,379	641%	24,325,253	1061%	40,238,594	120%	4,552,613
C	28,800,000	BBB	60%	1,382,400	100%	2,304,000	253%	5,824,856	921%	21,213,091	1250%	28,800,000	168%	3,872,013
D	28,800,000	BB	425%	9,792,000	350%	8,064,000	384%	8,855,550	1188%	27,374,990	1250%	28,800,000	195%	4,486,384
Equity	58,150,000	NR	1250%	58,150,000	1250%	58,150,000	656%	30,520,708	1250%	58,150,000	1250%	58,150,000	734%	34,154,623
Total Capital Charge ($M)				72,342,640		77,566,000		78,070,478		172,564,026		284,052,886		69,244,703
Multiple of loan pool charge				1.04		1.12		1.13		2.49		4.10		1.00

Chart of capital requirements

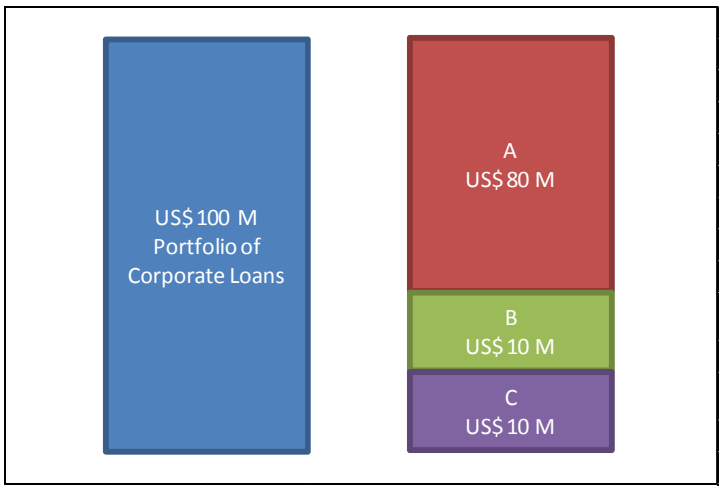
The charts below demonstrate the distribution of risk weights and capital charges under each of the methodologies.



7 Capital effects of changes in demand from non-banks

Consider the first example, except with the senior tranche sold to non-bank investors at a tighter spread. The capital outside the banking system will be lower due to the lower spread and the capital required within the banking system will be higher as they are retaining more of the spread.

Note that the originator is indifferent in terms of capital liberated by selling the portfolio.



In the original example the spreads to each of the notes are as given below:

Portfolio	Size ($M)	Spread	RW	8%	Capital ($M)	% Capital
Original	100	100	100%	8%	8.00	8.0%

Tranches	Size ($M)	Spread	RW	8%	Capital ($M)	% Capital
A	80	40	40%	8%	2.56	3.2%
B	10	80	80%	8%	0.64	6.4%
C	10	600	600%	8%	4.80	48.0%
Total	100				8.00	

We now consider that the Class A noteholders only receive a spread of 35bps. The capital charge to the Class A notes is reduced while the charge to the Class B noteholders is unchanged and the Class C noteholders have a higher charge. So if the Class B and C noteholders are banks the capital charge within the banking system will have increased.

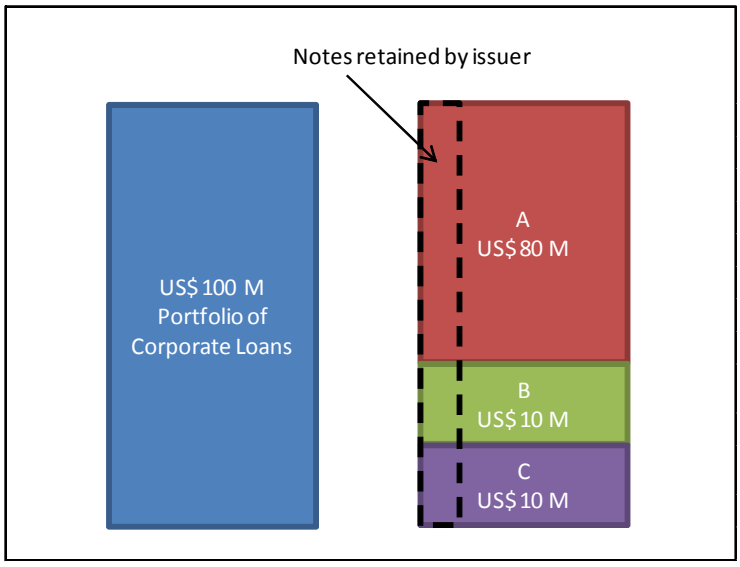
Portfolio	Size ($M)	Spread	RW	8%	Capital ($M)	% Capital
Original	100	100	100%	8%	8.00	8.0%

Tranches	Size ($M)	Spread	RW	8%	Capital ($M)	% Capital
A	80	35	35%	8%	2.24	2.8%
B	10	80	80%	8%	0.64	6.4%
C	10	640	640%	8%	5.12	51.2%
Total	100				8.00	

8 Risk Retention

8.1 Vertical slice

If the originating bank retains a percentage of the notes by means of a vertical slice (i.e. an equal percentage share in each tranche), then the percentage capital required against its retention will be the same as if it held the underlying loan pool. This method of risk retention ensures that the interests of the originator and investors are fully aligned.



Consider again example, which securitised a portfolio of BBB corporate loans.

Portfolio	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
Original	100	100	100%	8%	8.00	8.0%

Notes	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
A	80	40	40%	8%	2.56	3.2%
B	10	80	80%	8%	0.64	6.4%
C	10	600	600%	8%	4.80	48.0%
Total	100				8.00	

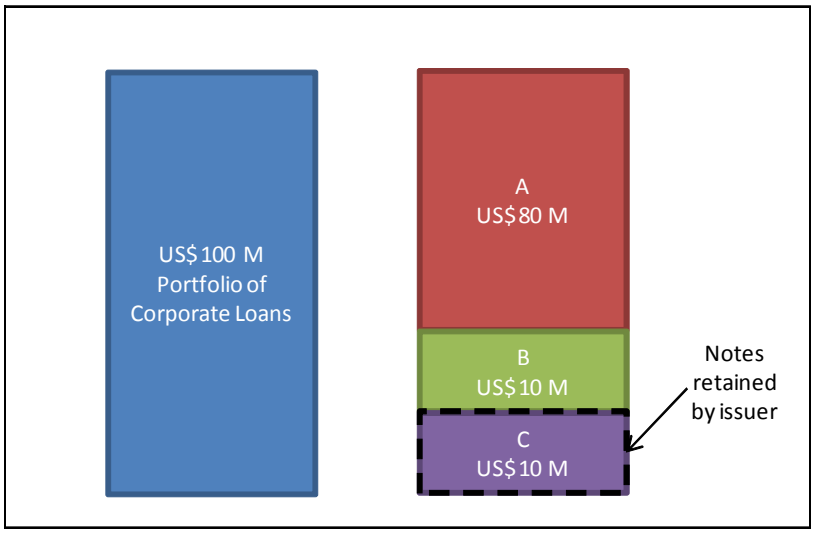
If the bank retained a 10% vertical slice it would need to hold US$ 0.8 M capital, or 8% of its US$ 10 M investment. By securitising the portfolio, it would receive US$ 90 M of funding and would free US$ 7.2 M of capital, consistent with retaining 10% of the risk of the original loan portfolio.

The table below shows the breakdown of the capital allocated to the bank's retained portion. The risk weights for each tranche have not changed from the previous example.

Notes	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
A	8.0	40	40%	8%	0.26	3.2%
B	1.0	80	80%	8%	0.06	6.4%
C	1.0	600	600%	8%	0.48	48.0%
Total	10.0				0.80	8.0%

8.2 First loss

If the originating bank chooses to retain the entire first loss piece then the percentage of capital required against its US$ 10 M investment will be much higher than if it held a vertical slice, as the risk of credit losses is more severe.



Continuing the example which securitised a portfolio of BBB corporate loans:

Portfolio	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
Original	100	100	100%	8%	8.00	8.0%

Notes	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
A	80	40	40%	8%	2.56	3.2%
B	10	80	80%	8%	0.64	6.4%
C	10	600	600%	8%	4.80	48.0%
Total	100				8.00	

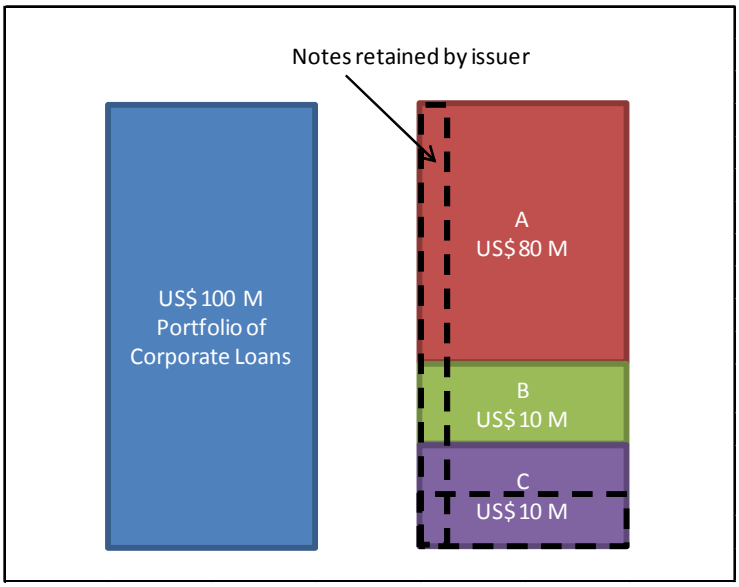
In this scenario, the bank would receive US$ 90 M of funding and would need US$ 4.8 M of capital for the US$ 10 M holding, US$ 3.2 M less than holding the entire loan portfolio. The table below shows the bank's retained position and required capital:

Notes	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
A	0.0	40	40%	8%	-	-
B	0.0	80	80%	8%	-	-
C	10.0	600	600%	8%	4.80	48.0%
Total	10				4.80	48.0%

The bank's incentive to increase risk in the portfolio to increase the returns to the Class C notes, which varies with the portfolio spread, is higher than under the vertical slice method of risk retention. For this reason, the interests of the issuer and investors in more senior notes have not been fully aligned, although the bank exposure will be the first to experience credit losses.

8.3 L-Shaped

Finally, if the originating bank chooses to retain its 10% through a vertical slice of all the notes along with an additional holding in the equity piece, it will have an L-shaped form of risk retention.



Continuing the example which securitised a portfolio of BBB corporate loans:

Portfolio	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
Original	100	100	100%	8%	8.00	8.0%

Notes	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
A	80	40	40%	8%	2.56	3.2%
B	10	80	80%	8%	0.64	6.4%
C	10	600	600%	8%	4.80	48.0%
Total	100				8.00	

With this form of risk retention, the bank will have positions in all three issued notes, shown below the capital required:

Notes	Size ($M)	Spread (bps)	RW	8%	Capital ($M)	% Capital
A	4.0	40	40%	8%	0.13	3.2%
B	0.5	80	80%	8%	0.03	6.4%
C	5.5	600	600%	8%	2.64	48.0%
Total	10				2.80	28.0%

Here the originator has retained 5% of the Class A and B notes (US$ 4 M and US$ 0.5 M respectively) and 55% of the Class C notes (US$ 5.5 M). The total capital required for this holding is US$ 2.8 M which is 28% of their US$ 10 M investment. The capital required is higher than under vertical slice retention, reflecting the increased credit risk in the larger share of the Class C notes. Again, the bank may have a bias towards returns to the Class C notes.