M E M O R A N D U M

To: EBA
Re: Comment on EBA proposed measurement of exposures to securitised assets
By: Gordian Knot
Date: August 2013

1 Purpose

The EBA issued a paper in May 2013 proposing new ways for banks to measure concentration risk in investments in transactions with underlying assets with a request for comments by 16th August 2013 and a proposed implementation date of 1st January 2014.

This memo explains why this issue is important as a matter of public policy, makes some observations about fundamental flaws in the EBA's proposed approach and proposes an alternative approach.

2 Executive Summary

Measurement of concentrations of risk in banks portfolios is important as diversified portfolios are less likely to result in bank failures than highly concentrated portfolios. The EBA's proposal, if adopted, would result in very high capital requirements for holdings of new credit in securitised form and this would feed through from investing banks to originating banks and on to consumer and SME borrowers, resulting in much lower levels of credit creation in the real economy. This is contrary to stated public policy[1] which is to increase the availability of credit to creditworthy consumers and SMEs, to restart the private sector securitisation market and not to hinder bank lending.

3 Comments on the EBA Proposal

The EBA proposal is fundamentally flawed as the way it measures credit risk cannot be used to aggregate different levels of risk to individual borrowers and it fails in its main goal as it doesn't help managers, supervisors or investors identify concentrations of risk in the portfolio.

We summarise some of the key criticisms below:

- **Credit enhancement:** All forms of structural protection and credit enhancement are completely ignored by the EBA approach – senior tranches are treated identically to first loss tranches. This is inconsistent with all other regulatory approaches.
- **Double counting for investments in multiple tranches:** When investors hold more than one tranche the underlying exposures are double counted, which results in multiples of the original total credit exposure.
- **Granularity:** The EBA proposal does not distinguish between well diversified and lumpy pools of credits in determining look-through requirements.
- **Unknown borrowers:** All borrowers that are not identified (most likely for personal privacy reasons) are assumed to be effectively the same single obligor – even if each

[1] Mario Draghi announced at a press conference in May 2013 that the ECB had started consultations with other EU institutions on initiatives to promote a functioning market for asset-backed securities collateralised by loans to non-financial corporations.

securitisation is based on many thousands of individual borrowers with little likelihood of overlap. They are also aggregated with loans to unknown borrowers from other securitisations, which may be in different countries or sectors.

- **Bank investors will have capital requirements which are much larger than those of the originating bank:** As the originating bank will view consumer loans as small individual exposures which do not aggregate to one large exposure they will have a much smaller capital requirement than a bank investing in a securitisation of the same assets which is required to treat all exposures as one large unknown exposure.
- **Bank investors will have exposures to the underlying which add up to more than their total investment:** As investors must assume full exposure to each of the underlying loans without any consideration of credit enhancement, their exposure to each of the unknowns will add up to more than their original investment, except in the case of unknown exposures, which will be capped at their investment size.

A full explanation is set out in Appendix 1 with worked examples which illustrate some of the failings in the EBA proposal.

4 Introduction to Alternative Approach

There are many ways to measure concentration risk; from simply asking "what are the biggest positions?" to highly mathematical correlation models, which involve many assumptions. We steer a middle ground for both management and supervisory purposes, rejecting both simple measures of size and complex models that are understood by a few specialists only and that do not give predictable outcomes. We prefer a "risk based" approach, using common tools that are comprehensible and usable by all of bank management, supervisors and analysts to assessing the lumpiness and riskiness of a bank's portfolio.

But before we introduce our approach to quantifying and managing concentration risk we start by outlining the objectives that any approach to measuring concentration risk should have.

Objectives:

We believe that the goals of any approach to measuring concentrations of risk in bank portfolios should be as follows:

I. Be risk based and not simply volume based
II. Allow different types of risk to the same borrower (or group of borrowers) to be aggregated in a logical and predictable way
III. Not create biases against certain types of credit exposure
IV. Have a thoughtful way to look at blind pools of obligors in securitisations
V. Be agnostic about which risk based approach is used
VI. Recognise structural protections
VII. Not lead to the double-counting of exposures

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

5 Proposal

First principles: Measuring concentration risk

To find a simple, elegant solution to this problem, that satisfies these objectives, we need to go back to first principles.

When considering concentration risk most measures start with the notional amount or volume of any extension of credit and then add additional notional exposure to the same borrower or to group entities. This seems to us to be a poor place to start.

When we think about risk we don't start with the total amount that could possibly be lost, but instead tend to think in a risk based manner. The BIS 1 capital system treated almost all assets as having the same risk and used a simple standard of 8% of capital for all of these assets (this is the same as a leverage test that is not risk based and ignores the quality of the assets). The current approach in BIS III is to assign capital based on risk, using either a standardised approach or a bank's own internally developed ratings based approach. While we do take issue with the use of ratings as a way to process the assignment of credit quality by bank regulators, we do agree that a risk based approach is generally preferable to a "one-size-fits-all" or a non-risk based approach.

If capital can be assigned based on risk, then why not use the amount of a bank's capital that is deployed to a single borrower or to a related group of borrowers to measure concentration risk? This has the benefit of measuring the actual risk (i.e. expected loss) and not simply the notional amount of exposure and allows a range of credit exposures of different levels of risk to a group of borrowers to be aggregated based on how much risk is involved in each transaction. On this basis the capital allocated to senior tranches of securitisations, with very little risk and accordingly lower capital allocations, can be added to the capital allocated to first loss notes in an entirely consistent and rational manner.

A number of different ways of assigning capital to risk can be used (we are entirely agnostic as to which method is used. In fact we prefer to use several different methods of allocating capital to risk including both regulatory capital models and a bank's own economic capital models, and to explore the differences) and a rank ordered list of largest users of capital can show where the real concentrations of risk lie. This approach focuses bank management and supervisors not simply on the large numbers of credit exposure but on the concentration in capital deployed to individual and related groups of borrowers.

Few would argue with this as a sensible starting point for observing concentrations. We have no issue with banks adding their own correlation assumptions between individual borrowers, industries, regions, countries etc. as a second step to explore the sensitivity of their portfolios further, but since this process will just provide guidance and not stable predictable results we do not propose requiring this to be made publicly available.

If this approach to measuring concentration risk works for direct extensions of credit, we now consider how to measure concentrations of credit exposure via investments in tranches of securitisations.

5.1 Known borrowers

For a portfolio of known underlying exposures we propose a risk based approach for calculating the exposure to each of the underlying obligors.

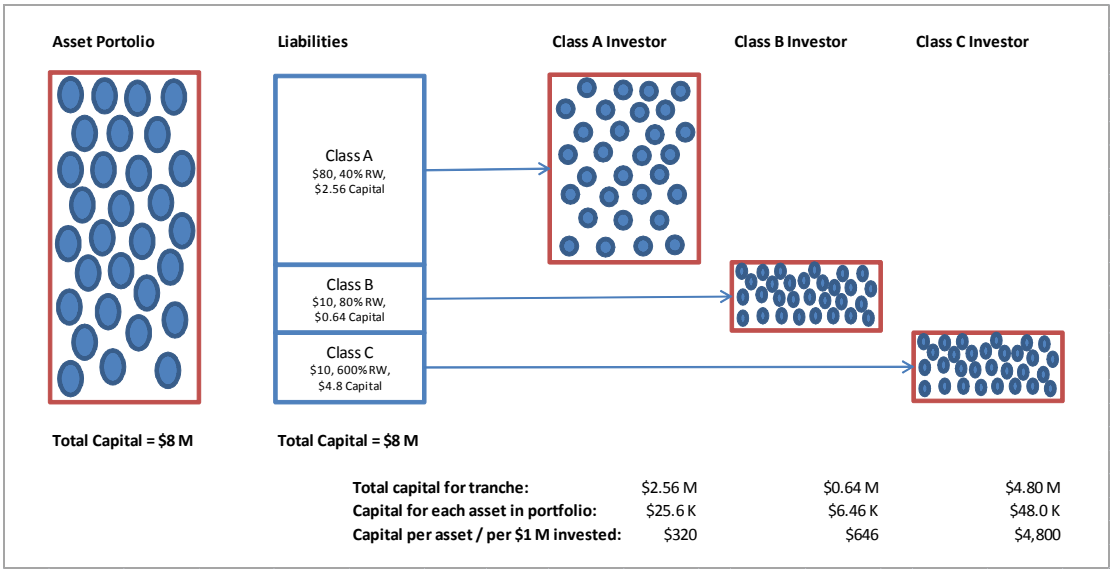
A broadly syndicated CLO portfolio typically provides full look through to each underlying obligor. However, the investors in each tranche have very different levels of risk on the underlying borrowers, based on their levels of credit enhancement. Simply adding the notional amounts, on a full look through basis, fails to thoughtfully add the amount of risk if the credit enhancement to each tranche is not considered.

If we first calculate the capital allocated to each tranche in the securitisation, capital can then be assigned to each of the underlying obligors dependant on which tranche a bank has invested in. So for example an investor in a senior tranche would hold less capital against an underlying obligor than an investor in a junior tranche.

For the purposes of calculating capital allocations we will use the "Return Allocated Capital Equivalence" (RACE) methodology, which ensures that the same total amount of capital is assigned to the securitisation as was used by the originating bank when the same assets were held on its balance sheet, capital can then be assigned to each of the underlying obligors in a manner that is arbitrage free. On this basis, the risk-weighted exposure to an obligor can be added to other credit positions that the bank has to the underlying obligors in a logical and consistent manner.

For further details on the RACE methodology please see the memo "A Return-Allocated Capital-Equivalence Approach for Securitisations" on the BIS website, http://www.bis.org/publ/bcbs236/gordian.pdf. Also, the example below which uses the RACE methodology is described in Appendix 2 in more detail.

In a simple example, if a CLO has 100 underlying assets of equal size and credit quality, the amount of capital allocated to the senior notes could be divided by 100 to find the capital which should be allocated to each of the underlyings. This method ensures that exposures to each of the known underlying obligors are considered whilst also capturing the protection provided by the capital structure.



This methodology has several merits. It is simple and transparent. There are no complex mathematical models and no assumptions. There is no capacity for originators or investors to arbitrage it. It recognises the differences in risk that first loss and last loss lenders have to the underlying credits via their holdings of different tranches. And it allows exposures to the

same borrowers of very different types (direct loans, secured loans, last loss tranches or first loss tranches in securitisations and derivative exposures) to be aggregated to measure concentration risk in a logical and meaningful manner. As a consequence, the language of concentration risk will change from "we have US$ 300 million notional exposed to borrower xyz in various types of exposure" to "we have US$ 25 million of capital exposed to all types of risk to xyz".

As the credit quality of the securitisation changes through life, experiencing defaults, prepayments, substitutions etc. the amount of capital required for each underlying obligor will change and these amounts will flow through to the total amount of capital allocated to each obligor. The RACE approach ensures that this process continues to be equivalent to the capital requirement that the originating bank would have held pre-securitisation.

As previously mentioned we have no view on the type of risk based capital model used to allocate capital to underlying credit exposures. In fact, using more than one capital model may be helpful to managers, supervisors and investors in understanding real concentrations of risk. It is important to be aware that capital models are subject to changes in fashion and technology and will change over time. The current trend is towards simplicity (hence the appeal of the leverage ratio) and away from complexity, but this will change as the shortcomings of blunt measures such as these become increasingly apparent.

5.2 Unknown borrowers

For securitisations with limited ability to look through to the underlying obligors, typically consumer borrowers for personal privacy reasons, or SMEs that are too small for an investor to have other exposures to or to have any meaningful data on, there are different issues to consider.

The size of any individual credit line within these pools should be insignificant in the context of the loss absorbing capacity of the investor bank's income or capital base. Further, it is highly unlikely the investor bank will have more than one exposure to any individual (such as a credit card loan, auto loan and mortgage loan). Even if an investor bank did have more than one exposure to the same consumer borrower the aggregate risk may still be too small to have any bearing on the bank's income stream or capital base.

We propose a granularity test for unknown borrower pools that recognises the difference between underlying borrowers that are large enough, such that they could result in meaningful concentrations, and those borrowers who are so small individually that, even if it were possible to look through to the end obligor and add up all of their credit risk, the aggregate would be too small to be meaningful to a lender.

5.2.1 Small unknown borrowers

For investments in securitisations, where the largest exposure is less than 1% of the pool, the exposure should be calculated as a unique investment at the securitisation level for large exposures limit purposes, rather than using a full look-through approach.

5.2.2 Large unknown borrowers

There may be instances when portfolios of unknown exposures have obligors that have exposure greater than 1% of the pool. In these circumstances we would present issuers with two options:

A. Improve reporting and provide loan level data to allow investors to do full look-through to the underlying assets, or

B. If this is not possible, then the issuer should certify that each obligor is unique. Using this information, bank investors can then add the largest exposure in the pool to their "unknown client" exposure. This will conservatively assume that the largest unknown borrower in all similar pools is the same, without going to the extreme assumption that all exposures in all pools are to the same obligor. See example in Appendix 3.

6 Existing Regulatory Concentration Test

The existing concentration test is a simple limit that large exposures may be no more than 25% of paid in capital. This uses notional exposure and so limits exposure to better quality individual credits where a bank is willing to hold larger exposures. This approach doesn't seek out the real concentration risks in the portfolio and the limit is based on the capital base which is a one-off ability to absorb losses and not the income stream which is the sustainable ability to absorb losses and is a better measure of loss absorption capability.

7 Summary

The benefits of our proposal are the following:

I. All risks are aggregated in a meaningful way
II. The benefits of credit enhancement are considered
III. Exposures are not double-counted
IV. The largest unknown exposures are aggregated in a reasonable and conservative manner

It is important to have control systems in place that are not based on arbitrary rules that lead to damaging market consequences but instead constrain bank risks in a consistent and rational manner. If appropriate control systems are used banks will have clear and simple guidelines to follow and will be incentivised to behave in a manner that satisfies regulators and be better able to handle any shocks to the system that they may face.

If risk based capital is used to control concentration risk within banks then capital allocation begins to act as an increasing tax on risk as limits are approached. An appropriate control system should consider credit quality, maturity, concentration and funding gap risk, and allocate increased capital in a progressive way as risk is increased in each "risk dimension". We believe the use of fully specified capital allocation models is a step towards this goal.

8 Conclusion

Concentration risk is a difficult problem to measure and set limits or capital charges against in a meaningful way that is simple enough to apply to all banks. The EBA approach however, fails even the most basic of objectives. The approach outlined here is risk based, logical, simple enough for management, regulators and investors to use as a common tool, and is a good building block for bank's own attempts at developing more sophisticated understanding of the concentration risks with their portfolios.

Appendix 1 – Analysis of EBA proposals

a) £50 M senior investment in a UK RMBS with unknown exposures

Consider a UK RMBS issuance with 20,000 mortgages of £100,000 each to unknown borrowers, total portfolio of £2,000 M. The RMBS has senior AAA notes which make up 85% of the issuance, £1,700 M, and £300 M equity notes. If the issuing bank was holding these mortgages on their balance sheet at a 35% risk weight they would utilise £56 M of capital. And as the mortgage borrowers are all known to the issuing bank they would all be individual clients to them and would not be aggregated for their large exposures purposes.

If a third party bank investor made a £50 M investment in the senior notes, they would need to hold £800,000 capital against this position at a 20% risk weight. However, using the EBA proposed method for calculating exposure to the underlying assets, the investor would have a £50 M exposure to the unknown client which would mean that given the large exposure limit of 25% of capital they would need a minimum capital base of £200 M in order to hold this position.

Issuing bank treatment	
Total un-securitised notional:	£2,000 M
Risk-based capital requirement (35% RW):	£56 M
Required capital base:	£56 M

Investor bank treatment	
Total notional exposure:	£50 M
Risk-based capital requirement (20% RW):	£0.8 M
Total exposure to unknown client:	£50 M
Required capital base:	£200 M

This approach does not give any benefit to the credit enhancement of the senior notes and leaves the investor with a capital requirement almost four times higher than what the originating bank had for holding the entire mortgage portfolio even though it was 40 times larger in notional terms.

b) £50 M senior investment in a European CLO with known exposures

Consider a European CLO with 100 loans of £5 M each to known borrowers, total size £500 M. The CLO has three tranches of £400 M (Senior), £50 M (Mezz) and £50 M (Equity). If an issuing bank was holding this portfolio on its balance sheet at a 100% risk weight it would require £40 M capital (£500 M * 100% * 8%).

If an investor made a £50 M investment in the senior notes they would need to hold £800,000 against this position at a 20% risk weight. However, using the EBA's proposed method of calculating exposure to the underlyings for large exposure purposes, this investor would have exposure of £62.5 M to the underlying assets (£5 M/8 = £625,000 to each of the 100 loans). The total exposure is clearly larger than the size of the original investment, and the credit enhancement available to the senior notes is ignored.

Issuing bank treatment

Total un-securitised notional:	£500 M
Risk-based capital requirement (100% RW):	£40 M

Investor bank treatment

Total notional exposure:	£50 M
Risk-based capital requirement (20% RW):	£0.8 M
Exposure to underlying assets:	£62.5 M (£625 K each)
Required capital base:	£2.5 M

In this example we see that when the underlying exposures are known the total exposure to the underlying assets is not capped at the investment size as is the case with unknown exposures.

c) £50 M senior investment and £10 M mezzanine investment in a European CLO with known exposures

Consider now the same CLO as before, but this time the investor invests £50 M in the senior notes and £10 M in the mezzanine notes. As before the senior investment would mean the investor had £625,000 exposure to each of the 100 underlying loans, but now the mezzanine investment would mean an additional exposure of £1 M (£5 M/5) to each of the 100 underlying loans. So the original £60 M investment would lead to £162.5 M exposure to the underlying loans.

Issuing bank treatment

Total un-securitised notional:	£500 M
Risk-based capital requirement (100% RW):	£40 M

Investor bank treatment for Class A

Total notional exposure:	£50 M
Risk-based capital requirement (20% RW):	£0.8 M
Exposure to underlying assets:	£62.5 M (£625 K each)

Investor bank treatment for Class B

Total notional exposure:	£10 M
Risk-based capital requirement (350% RW):	£2.8 M
Exposure to underlying assets:	£100 M (£1 M each)

Investor bank treatment for both investments

Total notional exposure:	£60 M
Total Risk-based capital required:	£3.6 M
Exposure to underlying assets:	£162.5 M (£1.625 M each)
Required capital base:	£6.5 M

Again the total exposure to the underlying assets is greater than the initial investment, also as both the mezzanine and senior note positions are treated as first loss notes the exposures to the names are double-counted.

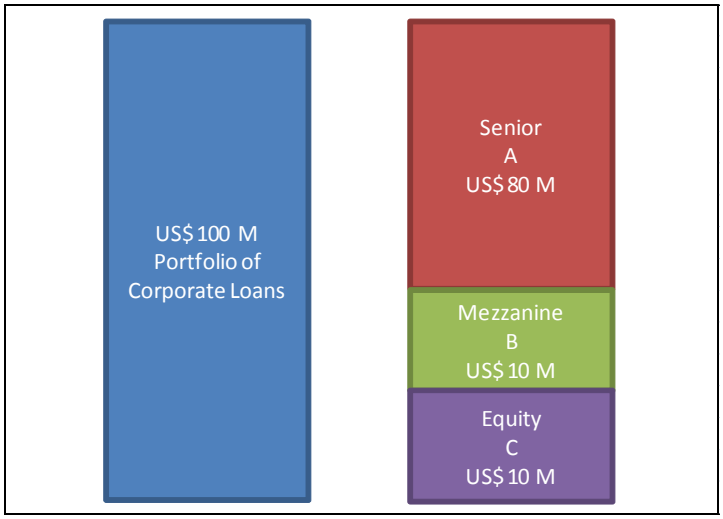
Appendix 2 – Worked example using RACE & risk based concentrations

If we compare the existing capital treatment for a bank's own portfolio of direct loans with the securitised tranches we can compare capital allocated for both and ensure that the process of securitisation is arbitrage free and that concentration risks are correctly added to existing positions. This base case is useful as it further demonstrates the many problems with the EBA approach.

Take a portfolio of 100 x US$ 1 M known BBB rated corporate loans. If the loans were all held by the originator US$ 8 M (US$ 100 M * 100% * 8%) of capital would be required under the standardised approach and the portfolio would be regarded as well diversified.

Loan Portfolio			
	Size	**RW**	**$ Capital**
Corporate 1	1	100%	0.08
Corporate 2	1	100%	0.08
Corporate 3	1	100%	0.08
Corporate 4	1	100%	0.08
Corporate 5	1	100%	0.08
Corporate 6	1	100%	0.08
Corporate 7	1	100%	0.08
Corporate 8	1	100%	0.08
Corporate 9	1	100%	0.08
Corporate 10	1	100%	0.08
⋮			
Corporate 89	1	100%	0.08
Corporate 90	1	100%	0.08
Corporate 91	1	100%	0.08
Corporate 92	1	100%	0.08
Corporate 93	1	100%	0.08
Corporate 94	1	100%	0.08
Corporate 95	1	100%	0.08
Corporate 96	1	100%	0.08
Corporate 97	1	100%	0.08
Corporate 98	1	100%	0.08
Corporate 99	1	100%	0.08
Corporate 100	1	100%	0.08
Total	**100**		**8.00**

If the same loans are securitised into three tranches then the aggregate risk does not change. In order to ensure capital equivalence US$ 8 M of capital is allocated between the three tranches. If all of the three tranches are held by the originating bank (unlikely in the real world but important to show that this approach is complete and arbitrage free) there has been no risk transfer, no capital relief and no new funding raised by the bank.



	Size	Spread (bps)	RW	$ Capital
Class A	80	40	40%	2.56
Class B	10	80	80%	0.64
Class C	10	600	600%	4.80
Total				8.00

If we use the RACE approach, which uses the return to each tranche to allocate capital and maintain capital equivalence, we find that the senior tranche requires US$ 2.56 M of capital, the mezzanine tranche US$ 0.64 M of capital and the junior tranche US$ 4.8 M. Then we can show that the exposure to each of the underlying obligors should be allocated $25.6/$6.4/$48 K capital for investments in the entire stock of A, B and C tranches respectively as shown in the table below. This process is consistent with capital equivalence as the total capital requirement is US$ 8 M.

Risk Weighted Exposures assigned to Investors in Securitised Notes				
	Class A	**Class B**	**Class C**	**Total**
Corporate 1	0.0256	0.0064	0.0480	0.0800
Corporate 2	0.0256	0.0064	0.0480	0.0800
Corporate 3	0.0256	0.0064	0.0480	0.0800
Corporate 4	0.0256	0.0064	0.0480	0.0800
Corporate 5	0.0256	0.0064	0.0480	0.0800
Corporate 6	0.0256	0.0064	0.0480	0.0800
Corporate 7	0.0256	0.0064	0.0480	0.0800
Corporate 8	0.0256	0.0064	0.0480	0.0800
Corporate 9	0.0256	0.0064	0.0480	0.0800
Corporate 10	0.0256	0.0064	0.0480	0.0800
⋮				
Corporate 89	0.0256	0.0064	0.0480	0.0800
Corporate 90	0.0256	0.0064	0.0480	0.0800
Corporate 91	0.0256	0.0064	0.0480	0.0800
Corporate 92	0.0256	0.0064	0.0480	0.0800
Corporate 93	0.0256	0.0064	0.0480	0.0800
Corporate 94	0.0256	0.0064	0.0480	0.0800
Corporate 95	0.0256	0.0064	0.0480	0.0800
Corporate 96	0.0256	0.0064	0.0480	0.0800
Corporate 97	0.0256	0.0064	0.0480	0.0800
Corporate 98	0.0256	0.0064	0.0480	0.0800
Corporate 99	0.0256	0.0064	0.0480	0.0800
Corporate 100	0.0256	0.0064	0.0480	0.0800
Total	**2.5600**	**0.6400**	**4.8000**	**8.0000**

If any of the tranches are now sold to a third party bank, that bank must allocate the same amount of capital to each underlying obligor as the originator would have done to ensure that the transaction is arbitrage free from the perspective of the banking system and the supervisor.

Let us assume that investor Bank A buys US$ 10 M of the senior tranche and has existing exposures of US$ 10 M each to 10 of the names in the loan pool, Bank B buys all of the Class B notes and has existing exposures of US$ 5 M each to 10 of the loan pool. Finally Bank C buys all of the Class C notes and has existing positions of US$ 10 M each to 10 of the loan pool. These examples show how the secured and unsecured exposures can be aggregated in a meaningful way.

Bank A: Invests in $10 M of Class A notes plus existing balance sheet exposures to Corps 91 to 100			
Capital Required	**Class A Position**	**Existing Positions**	**Total**
Corporate 1	0.003		0.003
Corporate 2	0.003		0.003
Corporate 3	0.003		0.003
Corporate 4	0.003		0.003
Corporate 5	0.003		0.003
Corporate 6	0.003		0.003
Corporate 7	0.003		0.003
Corporate 8	0.003		0.003
Corporate 9	0.003		0.003
Corporate 10	0.003		0.003
⋮			
Corporate 89	0.003		0.003
Corporate 90	0.003		0.003
Corporate 91	0.003	0.800	0.803
Corporate 92	0.003	0.800	0.803
Corporate 93	0.003	0.800	0.803
Corporate 94	0.003	0.800	0.803
Corporate 95	0.003	0.800	0.803
Corporate 96	0.003	0.800	0.803
Corporate 97	0.003	0.800	0.803
Corporate 98	0.003	0.800	0.803
Corporate 99	0.003	0.800	0.803
Corporate 100	0.003	0.800	0.803
Total	**0.320**	**8.000**	**8.320**

Bank B: Invests in $10 M of Class B notes plus existing balance sheet exposures to Corps 1 to 10			
Capital Required	**Class B Position**	**Existing Positions**	**Total**
Corporate 1	0.006	0.400	0.406
Corporate 2	0.006	0.400	0.406
Corporate 3	0.006	0.400	0.406
Corporate 4	0.006	0.400	0.406
Corporate 5	0.006	0.400	0.406
Corporate 6	0.006	0.400	0.406
Corporate 7	0.006	0.400	0.406
Corporate 8	0.006	0.400	0.406
Corporate 9	0.006	0.400	0.406
Corporate 10	0.006	0.400	0.406
⋮			
Corporate 89	0.006		0.006
Corporate 90	0.006		0.006
Corporate 91	0.006		0.006
Corporate 92	0.006		0.006
Corporate 93	0.006		0.006
Corporate 94	0.006		0.006
Corporate 95	0.006		0.006
Corporate 96	0.006		0.006
Corporate 97	0.006		0.006
Corporate 98	0.006		0.006
Corporate 99	0.006		0.006
Corporate 100	0.006		0.006
Total	**0.640**	**4.000**	**4.640**

Bank C: Invests in $10 M of Class C notes plus existing balance sheet exposures to Corps 1 to 10			
Capital Required	**Class C Position**	**Existing Positions**	**Total**
Corporate 1	0.048	0.800	0.848
Corporate 2	0.048	0.800	0.848
Corporate 3	0.048	0.800	0.848
Corporate 4	0.048	0.800	0.848
Corporate 5	0.048	0.800	0.848
Corporate 6	0.048	0.800	0.848
Corporate 7	0.048	0.800	0.848
Corporate 8	0.048	0.800	0.848
Corporate 9	0.048	0.800	0.848
Corporate 10	0.048	0.800	0.848
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Corporate 89	0.048		0.048
Corporate 90	0.048		0.048
Corporate 91	0.048		0.048
Corporate 92	0.048		0.048
Corporate 93	0.048		0.048
Corporate 94	0.048		0.048
Corporate 95	0.048		0.048
Corporate 96	0.048		0.048
Corporate 97	0.048		0.048
Corporate 98	0.048		0.048
Corporate 99	0.048		0.048
Corporate 100	0.048		0.048
Total	**4.800**	**8.000**	**12.800**

Appendix 3 – Example of large unknown exposures

Suppose a bank holds four securitisations with unknown underlying assets and with granularity above 1%. Assuming that the issuer can certify that obligors have been aggregated where necessary and that each obligor is unique, then it is only necessary to add the exposure of the largest obligor in each portfolio to the unknown client exposure, rather than the entire portfolio. Again, we believe the exposures considered should be the risk-weighted exposures rather than the notional exposure to each of the positions.

Portfolio 1				
Obligors	**Size ($)**	**Risk Weight**	**Capital Required ($)**	
Obligor 1	8	100%	0.64	← Largest
Obligor 2	4	150%	0.48	
Obligor 3	3	100%	0.24	
Obligor 4	2	50%	0.08	
Obligor 5	1	20%	0.08	
⋮				

Portfolio 2				
Obligors	**Size ($)**	**Risk Weight**	**Capital Required ($)**	
Obligor 1	6	20%	0.096	
Obligor 2	4	50%	0.160	← Largest
Obligor 3	2	100%	0.160	
Obligor 4	0.5	150%	0.060	
Obligor 5	0.4	150%	0.048	
⋮				

Portfolio 3				
Obligors	**Size ($)**	**Risk Weight**	**Capital Required ($)**	
Obligor 1	5	50%	0.20	
Obligor 2	4	100%	0.32	← Largest
Obligor 3	3	50%	0.12	
Obligor 4	2	100%	0.16	
Obligor 5	1	150%	0.12	
⋮				

Portfolio 4				
Obligors	**Size ($)**	**Risk Weight**	**Capital Required ($)**	
Obligor 1	12	20%	0.192	
Obligor 2	6	150%	0.720	← Largest
Obligor 3	3	100%	0.240	
Obligor 4	1.5	100%	0.120	
Obligor 5	0.8	50%	0.032	
⋮				

Unknown Client	
Position	**Capital Required ($)**
Portfolio 1	0.64
Portfolio 2	0.16
Portfolio 3	0.32
Portfolio 4	0.72
Total	**1.84**

As all of the underlyings are unknown, we do not know if the largest position in each portfolio is the same or different. It could be that the largest positions are all different but that the second largest obligor in each portfolio is the same. However, if the largest risk-weighted exposure in each of the portfolios is added to the unknown client exposure total, all obligors will comply with the large exposures limit.