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Analysis of Tranche Maturity calculation methods for the Securitization External Rating Based Approach (SEC-ERBA).

Introduction

The European Banking Authority (EBA) Guidelines[1] detail the appropriate methods of determination of the regulatory capital pertaining to securitization outlined in the Basel III regulation. Among the requirements the setting of regulatory capital floors (RCFs) focuses on tackling systemic liquidity risks through a hierarchy of approaches.

In this paper, we focus on the implementation of the securitization external rating based approach (SEC-ERBA) in calculating the RCF for a given maturity. We have compared the two possible methods leveraging the Legal Maturity (M_L) and the Weighted Average Maturity (M_{WAM}) respectively with the aim of identifying the minimal floor level.

The study is conducted for over 2,000 EMEA RMBS, AUTO and ABS securities as well as over 9,000 tranches of US and European CLOs across all past vintages. In our observation, 38% of these securities show a difference in RCF value between the two methods, representing an overall average difference of €5,980 per €1,000,000 of invested notional balance. Table 1 below shows the difference in regulatory capital between the two methodologies across asset classes.

Table 1 Notional Difference in RCF by Asset Class

ASSET CLASS	SECURITIES	AVG REGULATORY CAPITAL DIFFERENCE BETWEEN THE M_L AND M_{WAM} METHODS				
		Δ PRESENT	PERCENTAGE	M_L RCF	M_{WAM} RCF	NOTIONAL Δ
ABS	321	88	27%	139,168.87	111,311.08	27,857.79
AUTO	225	166	74%	162,929.75	135,314.48	27,615.27
RMBS	1,646	252	15%	110,778.03	94,741.56	16,036.47
CLO	9,346	3,787	41%	51,768.44	47,756.46	4,011.99

[1] EBA framework:
https://www.eba.europa.eu/sites/default/documents/files/document_library/Publications/Guidelines/2020/Guidelines%20on%20the%20determination%20of%20the%20weighted%20average%20maturity%20of%20the%20tranche/883213/Guidelines%20on%20WAM.pdf

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Weighted Average Maturity Assumptions

We compared the two possible calculation methods[2] using the Legal Maturity (M_L) and the Weighted Average Maturity (M_{WAM}) respectively. When using the M_{WAM} method the tranche maturity may be determined with different sets of assumptions for the cash flows used in its calculation as outlined in the framework published by the EBA[3].

Prepayment Rate Assumptions

The EBA conducted a consultation on relevant assumptions to be used when determining the WAM[4] values. Institutions may consider one of the three following options[5]:

(a) the prepayment rate considered in the base case scenario of the pricing prepayment assumptions[6] of the transaction, with a 20% cap;

(b) the lowest historical prepayment rate of the asset class observed quarterly, or at least annually, over the longest available period, with a minimum of 5 years[7], in the country in which the assets were originated;

(c) the average observed quarterly prepayment rate throughout the life of the transaction since its inception, with a minimum of 1 year's data.

CLO transactions do not feature a reported CPR rate that could be leveraged for assumptions (b) and (c). The study of CLO tranches for different prepayment rates ranging from 0 to 20% annually (2.5% increments) reveals that the lowest RCF corresponds to the highest rate. This paper focuses on the 20% CPR assumption for CLO securities as per the option (a) cap.

Default, Loss Rate and Recovery Assumptions

In addition to the above criterium an assumed 0% CDR for any performing portfolio was established as a norm across the asset class. The Loss Rate and Recovery Lag on these defaults are therefore nullified as well under this framework.

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[2] See Appendix 1 for the detail of the calculation of the two methods.

[3] EBA framework: https://www.eba.europa.eu/sites/default/documents/files/document_library/Publications/Guidelines/2020/Guidelines%20on%20the%20determination%20of%20the%20weighted%20average%20maturity%20of%20the%20tranche/883213/Guidelines%20on%20WAM.pdf

[4] Throughout this paper the weighted average maturity values were calculated based on cash flow projections computed as of the March 15, 2023.

[5] These options are quoted from the EBA framework guidelines (page 21, "*Assumptions in relation to prepayments*"), see the source link in the "Further reading" section at the end of this paper.

[6] These pricing scenarios are featured on the transaction's prospectus or term sheet and the base case represents the lowest prepayment speed assumption listed.

[7] In this paper we have picked categories (country, asset type) of RMBS and ABS securities that featured an observable historical average CPR and calculated the rolling yearly average in each case per option (b). The minimum was then selected in each case over the past 8 years (Q1 2015 to Q4 2022) as the longest observable period of data consistently across asset types.

RMBS & ABS Analysis

Our focus in this study is to maximize CPR assumptions so as to obtain the RCF value using the M_{WAM} method. For EMEA RMBS and ABS securities we have leveraged our extensive data set to determine the maximum CPR assumption between option (b) and (c).

We have retained 37 eligible asset types across 9 European countries for which the (b) option may be leveraged thanks to a sufficient data history. In each case where the lifetime CPR of option (c) was unavailable, lower or covered under 1 year of history we used the option (b) assumption instead for the RCF determination.

CPR Assumption Breakdown by Asset Types

The below table presents a list of the 19 main RMBS and ABS asset types belonging to the seven main countries selected in the EMEA region with an added miscellenaous category. We can observe that, for eight of these, over 60% of securities present a lower RCF using the M_{WAM} method and that seven of these are either backed by Auto Leases or Prime Auto Loans. The average difference ranges between 190 and 369 basis points for these asset types.

Table 2 RCF Difference (Δ) for the M_L and M_{WAM} Methods by Asset Type

COUNTRY	ASSET TYPE	SECURITIES	RCF DIFFERENCE BETWEEN THE M_L AND M_{WAM} METHODS				
			Δ PRESENT	PERCENTAGE	RCF M_L	RCF M_{WAM}	AVG DIFF
FRANCE	ABS - Automobiles - Prime	23	23	100%	4.39%	2.70%	169bp
	ABS - Consumer Loans	36	25	69%	13.16%	9.51%	365bp
	ABS - Leases - Auto	16	12	75%	12.40%	9.73%	267bp
	MBS - Prime	53	13	25%	2.76%	2.01%	75bp
GERMANY	ABS - Automobiles - Prime	37	23	62%	15.60%	13.14%	246bp
IRELAND	MBS - Prime	84	11	13%	12.27%	10.57%	170bp
ITALY	ABS - Automobiles - Prime	19	13	68%	16.77%	12.87%	390bp
	ABS - Consumer - CDQ	30	10	33%	14.71%	13.80%	91bp
	MBS - Prime	145	31	22%	4.89%	3.51%	137bp
NETHERLANDS	ABS - Leases - Auto	23	17	74%	7.51%	5.61%	190bp
	MBS - Prime	164	9	5%	9.18%	7.39%	178bp
SPAIN	ABS - Automobiles - Prime	57	41	72%	23.97%	21.15%	282bp
	ABS - Consumer Loans	52	18	35%	22.09%	18.45%	364bp
	ABS - Small Business Loans	76	7	9%	4.46%	2.05%	241bp
	MBS - Prime	407	62	15%	8.00%	6.24%	176bp
UNITED KINGDOM	ABS - Leases - Auto	45	34	76%	22.18%	18.49%	369bp
	MBS - Buy to Let	249	44	18%	22.56%	19.79%	277bp
	MBS - Non-Conforming	262	46	18%	14.07%	12.89%	118bp
	MBS - Prime	137	25	18%	4.85%	4.20%	65bp
	Miscellenaous[8]	276	40	14%	3.14%	2.53%	60bp
	Total	2,191	504	23%	13.28%	11.09%	219bp

[8] The Miscellenaous category regroups the asset types that featured less than 10 securities for which a difference in RCF was observed with the exception of Dutch prime RMBS securities and Spanish transactions backed by Small Business Loans. Categories belonging to Portugal and Belgium are all included in this aggregate due to the smaller number of securities observed in these countries.

Method Comparison Breakdown by Country

The below table presents a country breakdown of all ABS and RMBS securities across different seniorities. We focus here on the average difference (AVG Δ) in RCF between the M_L and M_{WAM} methods. The impact when using the M_{WAM} method is most prevalent among German and French securities where 57% of all tranches across all seniorities present a lower resulting RCF with an average difference of 251bp and 236bp for these countries' subsets respectively.

If we focus on the seniority of the securities, we can observe that 34% of the 810 senior tranches present a difference in RCF against 25% and 6% for Mezzanine and Subordinated tranches respectively. However this difference is significantly higher for the Mezzanine and Subordinated subsets with 403bp and 433bp on average against only 60bp for Senior tranches.

Table 3 Regulatory Capital (RCF) Difference (Δ) for the M_L and M_{WAM} Methods by Seniority

COUNTRY	REGULATORY CAPITAL DIFFERENCE BETWEEN THE M_L AND M_{WAM} METHODS								
	SUBORDINATE			MEZZANINE			SENIOR		
	SECURITIES	PERCENTAGE	AVG Δ	SECURITIES	PERCENTAGE	AVG Δ	SECURITIES	PERCENTAGE	AVG Δ
UNITED KINGDOM	145	10%	475bp	334	22%	338bp	247	29%	39bp
SPAIN	178	6%	418bp	221	26%	393bp	217	29%	63bp
ITALY	117	2%	530bp	69	22%	490bp	99	57%	91bp
NETHERLANDS	51	10%	308bp	88	9%	389bp	85	17%	30bp
FRANCE	20	0%	0bp	43	65%	516bp	67	67%	61bp
IRELAND	31	0%	0bp	26	4%	1,039bp	62	16%	83bp
GERMANY	9	0%	0bp	20	65%	445bp	15	80%	40bp
PORTUGAL	7	0%	0bp	11	0%	0bp	15	27%	24bp
BELGIUM	3	0%	0bp	8	50%	378bp	3	0%	0bp
Total	561	6%	433bp	820	25%	403bp	810	34%	60bp

Method Comparison Breakdown by Rating

The table below presents the breakdown of observed RCF differences across ratings. We notice that the highest differences concern securities rated Ba1 to Ba3 with a over 500bp of difference on average. The differences observed for Aaa classes is significantly lower than that of lower rated securities (Aa1 to B3). This can be explained by the preponderance of senior tranches in this subset which incur a lower five year risk weight value (RW_5 of 20%, vs 70% for non-senior) resulting in a narrower gap in RCF values.

The securities rated Caa1 and below presented no difference while very few securities rated B2 and B3 did. Most of them present a maturity M_{WAM} longer than five years which is therefore capped and identical across the two methods. This is due to the sequential nature of repayments in their cash flow waterfall. A few subordinate tranches also present a difference as they belong to older transactions which are typically already partially redeemed.

Table 4 RCF Difference (Δ) for the M_L and M_{WAM} Methods by Rating

RATING[9]	SECURITIES	REGULATORY CAPITAL DIFFERENCE BETWEEN THE M_L AND M_{WAM} METHODS				
		Δ PRESENT	PERCENTAGE	RCF M_L	RCF M_{WAM}	AVG Δ
Aaa	425	160	38%	2.70%	2.08%	62bp
Aa1	125	48	38%	5.24%	2.28%	297bp
Aa2	106	42	40%	5.30%	3.05%	225bp
Aa3	103	62	60%	4.10%	2.90%	120bp
A1	102	33	32%	8.30%	5.58%	273bp
A2	87	28	32%	12.03%	9.76%	227bp
A3	52	23	44%	15.75%	11.24%	451bp
Baa1	34	10	29%	23.74%	20.24%	351bp
Baa2	42	17	40%	24.02%	20.80%	322bp
Baa3	50	21	42%	29.84%	25.42%	442bp
Ba1	42	12	29%	42.69%	37.57%	512bp
Ba2	38	12	32%	53.97%	48.16%	581bp
Ba3	29	17	59%	63.42%	58.31%	511bp
B1	23	14	61%	60.96%	59.08%	188bp
B2	26	1	4%	27.20%	25.68%	152bp
B3	43	4	9%	32.00%	29.83%	217bp
Caa1	3	0	0%	0.00%	0.00%	0bp
Caa2	5	0	0%	0.00%	0.00%	0bp
Caa3	22	0	0%	0.00%	0.00%	0bp
Ca	36	0	0%	0.00%	0.00%	0bp
C	59	0	0%	0.00%	0.00%	0bp
NR	459	0	0%	0.00%	0.00%	0bp
WR	280	0	0%	0.00%	0.00%	0bp
Total	2,191	504	23%	13.28%	11.09%	219bp

[9] We are using the Moody's rating scale in order to illustrate the table. For the detail of the methodology used please refer to Appendix 3 and 4.

Method Comparison Breakdown by Vintage

The below table presents a breakdown by vintage of the data set. The outstanding tranches of older transactions tend to be lower down the capital structure and also belong to asset types with lower prepayment profiles. Therefore while they are shorter dated on average within their respective categories they also present a typically slower amortization profile.

In contrast the prepayment rates for the underlying pools of more recent securities present a higher CPR on average resulting in a faster amortization profile. They are also located higher in the capital structure on average and are therefore repaid earlier in sequential order. These competing factors result in a mixed picture on the frequency and average RCF difference between methods presented in the table below.

Table 5 RCF Difference (Δ) for the M_L and M_{WAM} Methods by Vintage

VINTAGE	SECURITIES	REGULATORY CAPITAL DIFFERENCE BETWEEN THE M_L AND M_{WAM} METHODS				
		Δ PRESENT	PERCENTAGE	RCF M_L	RCF M_{WAM}	AVG Δ
2022	207	74	36%	22.08%	19.59%	248bp
2021	261	98	38%	19.88%	17.10%	278bp
2020	247	61	25%	13.23%	10.71%	252bp
2019	161	43	27%	12.98%	10.47%	251bp
2018	173	26	15%	12.87%	10.59%	228bp
2017	52	12	23%	2.83%	2.06%	77bp
2016	77	25	32%	10.37%	7.84%	253bp
2015	21	9	43%	4.86%	2.54%	232bp
2014	28	8	29%	2.79%	1.90%	89bp
2013	15	2	13%	4.39%	1.63%	276bp
2012	48	16	33%	3.03%	1.97%	106bp
2011	40	2	5%	3.40%	2.53%	87bp
2010	38	2	5%	3.00%	2.29%	71bp
2009	89	15	17%	5.89%	2.11%	378bp
2008	183	10	5%	13.84%	12.43%	142bp
2007	333	50	15%	8.35%	7.17%	119bp
2006	162	31	19%	7.72%	6.54%	118bp
<2006	56	20	39%	5.75%	4.02%	174bp
Total	2,191	504	23%	13.28%	11.09%	219bp

CLO Analysis

The research conducted was performed under a 20% CPR assumption as this is the maximum rate available under option a) of the EBA framework. We also compared the two methods under a 0% CPR scenario so as to evaluate the impact of prepayments on M_{WAM} RCF results. It was conducted on both US and European CLO transactions.

Method Comparison Breakdown by Rating

The high prepayment rate brings a large portion of the redemptions forward in time and results therefore in a set of lower M_{WAM} values than those observed under the lower bound scenario (0% CPR) for the same universe of securities. A greater difference in RCF is observed between the two methods for these tranches. We also observe that for a greater proportion of securities, particularly down the capital structure, these values are under the 5 year cap and create a difference as well.

European CLO securities tend to present a lower RCF for the M_{WAM} method more frequently (90% of tranches) for the highest rated tranches but with a lower average difference of 27 basis points against 31 for their US counterparts. We observe that these US securities were issued 4 years ago on average and 2 months later than European Aaa rated tranches. While this difference may seem small, it does tip a higher percentage of corresponding M_{WAM} values below the 5 year cap. This results in a much higher percentage of European securities presenting an RCF difference.
The overall average reduction across all credit quality steps is 57bp for European deals for 37% of tranches against 32bp for 42% of tranches in the US. The below table presents the results using the scenario of a 20% CPR assumption as outlined in subsection (a) of the EBA framework for the metrics outlined by the calculations of figures[10] 2 to 5:

Table 6 CLO RCF Difference (Δ) for the M_L and M_{WAM} Methods by Rating

RATING	RCF Δ FOR M_L AND M_{WAM} METHODS							
	US CLO TRANCHES				EURO CLO TRANCHES			
	SECURITIES	Δ PRESENT	PERCENTAGE	AVG Δ	SECURITIES	Δ PRESENT	PERCENTAGE	AVG Δ
Aaa	2,172	1,497	69%	31bp	557	504	90%	27bp
Aa1	205	177	86%	118bp	146	131	90%	129bp
Aa2	783	291	37%	80bp	672	239	36%	86bp
Aa3	49	45	92%	161bp	24	9	38%	200bp
A1	112	73	65%	122bp	67	64	96%	109bp
A2	725	194	27%	54bp	437	112	26%	83bp
A3	37	18	49%	169bp	16	2	13%	127bp
B1	88	28	32%	46bp	13	1	8%	19bp
B2	18	0	0%	0bp	86	0	0%	0bp
B3	145	0	0%	0bp	346	0	0%	0bp
Ba1	70	19	27%	84bp	4	3	75%	213bp
Ba2	37	8	22%	143bp	146	57	39%	69bp
Ba3	779	46	6%	100bp	321	6	2%	43bp
Baa1	48	21	44%	105bp	24	22	92%	68bp
Baa2	80	40	50%	103bp	118	74	63%	69bp
Baa3	704	100	14%	61bp	317	6	2%	112bp
Total	6,052	2,557	42%	32bp	3,294	1230	37%	57bp

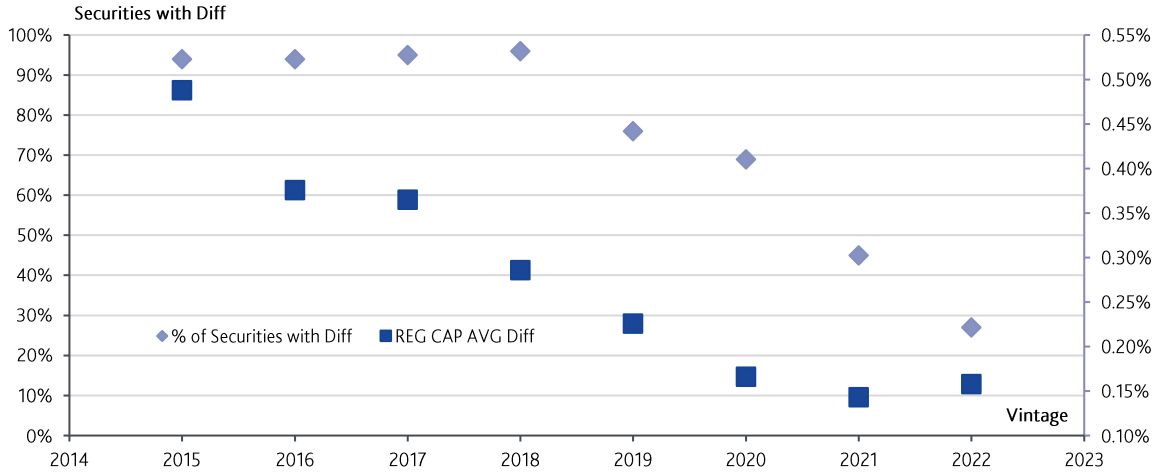
[10] See Appendix 1 and 2 for these figures and further details

Method Comparison Breakdown by Vintage for CLO Aaa rated Tranches

The homogeneity of the CLO asset class as well as the high number of deals enables us to study the impact of the vintage on the difference between the M_L and M_{WAM} methods. We notice that the older the security is the more likely it is to present a lower RCF using the M_{WAM} calculation. For securities issued up to year 2018 over 90% of the tranches studied present an RCF difference. This rate then falls steadily for more recent vintages. Older Aaa rated CLO securities present this wider gap more frequently on average for M_{WAM} and M_L due to their seniority in the capital structure.

Similarly we observe the decrease in the value of M_{WAM} as we consider securities of older vintages. In contrast M_L sees little impact as the vast majority of these securities present a legal maturity 5 years or more into the future regardless of their vintage. The average importance of the gap stops following this linear trend for securities issued in the last 2 years. For these subsets it is calculated based on a smaller proportion of the cohorts (less than 50%) with more tenuous differences being observed for a given year which increases statistical noise in the end result.

Figure 1. Method impact on RCF by Vintage (Aaa CLO tranches)



Summary of Notional Differences Using the M_{WAM} Method for ABS, RMBS and CLOs

Here we consider an investment of notional EUR 1,000,000 and determine the amount spared by an investor by leveraging the M_{WAM} Regulatory Capital calculation with the highest CPR assumption allowed. We notice high discrepancies between asset classes on the proportion of securities benefiting from the use of the M_{WAM} method. We can observe that the resulting average difference for these ABS and RMBS asset types ranges from EUR 6,500 to 39,000 on a single position of this size. For CLOs the average difference varies significantly between the different vintages and ratings as detailed previously.

Table 7 Notional Differences between the two Methods

COUNTRY	ABS-RMBS						
	ASSET TYPE[11]	SECURITIES	AVG REGULATORY CAPITAL DIFFERENCE BETWEEN THE M_L AND M_{WAM} METHODS				
			Δ PRESENT	PERCENTAGE	M_{WAM} RCF(%)	M_{WAM} RCF	NOTIONAL Δ
FRANCE	ABS - Automobiles - Prime	23	23	100%	2.70%	27,000.0	16,900.0
	ABS - Consumer Loans	36	25	69%	9.51%	95,100.0	36,500.0
	ABS - Leases - Auto	16	12	75%	9.73%	97,300.0	26,700.0
	MBS - Prime	53	13	25%	2.01%	20,100.0	7,500.0
GERMANY	ABS - Automobiles - Prime	37	23	62%	13.14%	131,400.0	24,600.0
IRELAND	MBS - Prime	84	11	13%	10.57%	105,700.0	17,000.0
ITALY	ABS - Automobiles - Prime	19	13	68%	12.87%	128,700.0	39,000.0
	ABS - Consumer - CDQ	30	10	33%	13.80%	138,000.0	9,100.0
	MBS - Prime	145	31	22%	3.51%	35,100.0	13,700.0
NETHERLANDS	ABS - Leases - Auto	23	17	74%	5.61%	56,100.0	19,000.0
	MBS - Prime	164	9	5%	7.39%	73,900.0	17,800.0
SPAIN	ABS - Automobiles - Prime	57	41	72%	21.15%	211,500.0	28,200.0
	ABS - Consumer Loans	52	18	35%	18.45%	184,500.0	36,400.0
	ABS - Small Business Loans	76	7	9%	2.05%	20,500.0	24,100.0
	MBS - Prime	407	62	15%	6.24%	62,400.0	17,600.0
UNITED KINGDOM	ABS - Leases - Auto	45	34	76%	18.49%	184,900.0	36,900.0
	MBS - Buy to Let	249	44	18%	19.79%	197,900.0	27,700.0
	MBS - Non-Conforming	262	46	18%	12.89%	128,900.0	11,800.0
	MBS - Prime	137	25	18%	4.20%	42,000.0	6,500.0
JURISDICTION	CLOs						
USA	HY CLO-Arbitrage Cash Flow	6,052	2,557	42%	4.61%	46,100.0	3,200.0
EUROPE	HY CLO-Arbitrage Cash Flow	3,294	1,230	37%	5.12%	51,200.0	5,700.0
	Total	11,261	4,251	38%	5.49%	54,900.0	5,980.0

[11] The list in this table is not exhaustive. Asset types that featured less than 10 securities for which a difference in RCF was observed with the exception of Dutch prime RMBS securities and Spanish transactions backed by Small Business Loans. Categories belonging to Portugal and Belgium are absent altogether.

Conclusion

The minimum regulatory capital to be set aside for a securitized asset position may be determined using the legal maturity of the tranche for simplicity. The alternative method leveraging the weighted average maturity, although more complex, yields a lower or equal capital charge to be applied for any given security. This second method presents an increased risk sensitivity across the universe of transactions. For any security considered the highest CPR assumption within the limits set by the regulator corresponds to the RCF calculation through the use of the M_{WAM} method.

Senior tranches at the top of the credit stack are where differences are observed most frequently across the set of available securities. These discrepancies are distributed unevenly across vintages as is observable for CLO tranches where older deals are affected in greater proportions for the same rating and level of seniority. The average size of the gap between the two methods also tends to increase with the age of issuance for these securities.

The highest differences in RCF calculations are observed for short dated notes lower down the capital structure. The higher risk weights[12] assigned to them by the regulator mean that variations in the maturity value impact the RCF[13] determination to a greater extent. However many of these tranches' WAM breach the 5 year cap which nullifies the difference between the two methods. This can be observed with recently issued Mezzanine and Subordinate tranches presenting differences between the two methods less frequently. This can be mitigated by using the highest possible CPR value as an assumption for deals amortizing their tranches sequentially.

The use of M_{WAM} in order to determine the RCF for a position on the tranche of a securitization transaction increases risk sensitivity in a significant portion of cases when compared against M_L. The gap observed is non negligeable in most of these cases as demonstrated by the results outlined.

[12] See Appendix 3 for details

[13] See Appendix 2 for the detail of the RCF calculation and the impact of risk weights.

Appendix: Calculation of Regulatory Capital

The capital requirement(CR) for a given tranche is calculated as 8% of the risk weight (RW) associated for a given maturity. The latter may be calculated either using the WAM or Mt method as per the EBA framework.

Appendix 1: Maturity Calculation

The tranche maturity is the effective maturity that is remaining and is expressed in years. In order to calculate it, the institution can choose between two possible ways as defined in article 22 of the "Basel III Document Revisions to the securitisation framework".

The Maturity variable X referred to in Figure 1 and Figure 2 above is to be calculated as M_L or M_{WAM} as per the SEC-ERBA guidelines.

The method to determine the maturity M_L based on the Final Legal Maturity (M_F) of the tranche can be found on Figure 3:

Figure 2 $M_L = 1 + (M_F - 1) \times 0.8$ (floored at 1, capped at 5, in years)

The method to determine the maturity MWAM is as per Figure 4 using the cash flows of the tranche (CFt) paid out at time t to the noteholder (principal, interests and fees as applicable):

Figure 3 $M_{WAM} = \frac{\sum_t (t \times CF_t)}{\sum_t CF_t}$ (floored at 1, capped at 5, in years)

The Cash flows CF_t are compiled with the following lower bound case assumptions: 0% Constant Prepayment Rate (CPR), 0% Constant Default rate (CDR), 0% Loss Rate, 0% Recovery Lag, 30/360 day count. The options for these assumptions are discussed in the next section.

Appendix 2: Risk Weight Interpolation and Regulatory Capital Calculation

The risk weight is determined according to two distinct scales for senior and non-senior tranches respectively set out by the regulation. Each scale lays out a set of 1 year and a set of 5 year risk weight values (RW1 and RW5) corresponding to the rating of the tranche.

The risk weight (RW) of the tranche is then calculated based on the tranches' thickness (T, see figure 4) per Article 257 of the CRR and using an interpolation (RWX) of RW1 and RW5 for the tranche maturity (X) (see figure 3). The resulting capital requirement (CR, see Figure 5) is calculated as 8% of the RW value.

Figure 4 $RW_X = RW_1 + (X\text{-}1)\left(\frac{RW_5 - RW_1}{5-1}\right)$

Figure 5 $RW = RW_X \times (1 - \min(T\ ;\ 0.5))$

Figure 6 $CR = RW \times 8\%$

Appendix 3: Risk Weight Scales

In this paper we consider securities that feature a long-term credit assessment therefore and as per article 263[14] of the CRR the risk weights set out in Figure 4 and 5 shall apply. See the figure below which presents the scales of values for RW_1 and RW_5 according to the seniority status and rating of the tranche:

Figure 7 Risk Weights

	SENIOR TRANCHE		NON-SENIOR (THIN) TRANCHE	
RATING[15]	RW_1	RW_5	RW_1	RW_5
Aaa	15%	20%	15%	70%
Aa1	15%	30%	15%	90%
Aa2	25%	40%	30%	120%
Aa3	30%	45%	40%	140%
A1	40%	50%	60%	160%
A2	50%	65%	80%	180%
A3	60%	70%	120%	210%
Baa1	75%	90%	170%	260%
Baa2	90%	105%	220%	310%
Baa3	120%	140%	330%	420%
Ba1	140%	160%	470%	580%
Ba2	160%	180%	620%	760%
Ba3	200%	225%	750%	860%
B1	250%	280%	900%	950%
B2	310%	340%	1050%	1050%
B3	380%	420%	1130%	1130%
Caa1 / Caa2 / Caa3	460%	505%	1250%	1250%
Below Caa3	1250%	1250%	1250%	1250%

Appendix 4: Rating Allocation for Individual Securities

In this paper we are taking a conservative approach to the ratings' allocation in line with regulation guidelines. In cases where several ratings were assigned to a security corresponding to different credit quality steps we have picked the lowest step and assigned it to the security. The corresponding risk weights are then used to calculate the minimum regulatory capital to be retained. The tables throughout this paper present categories of ratings according to this approach and in line with the different credit quality steps and use Moody's taxonomy for illustrative purposes only.

[14] Article 263 of the CRR:

https://www.eba.europa.eu/regulation-and-policy/single-rulebook/interactive-single-rulebook/101094" \l ":~:text=Under%20the%20SEC-ERBA%2C%20the%20risk-weighted%20exposure%20amount%20for,applicable%20risk%20weight%20in%20accordance%20with%20this%20Article

[15] We used Moody's ratings for illustrative purposes only and in line with the credit quality steps laid out in the Article 263 of the CRR.

Further Reading

The below links include all sources leveraged for this research in addition to Moody's Analytics tools and data.

EBA framework:
https://www.eba.europa.eu/sites/default/documents/files/document_library/Publications/Guidelines/2020/Guidelines%20on%20the%20determination%20of%20the%20weighted%20average%20maturity%20of%20the%20tranche/883213/Guidelines%20on%20WAM.pdf

Article 257 of the CRR: https://lexparency.org/eu/CRR/ART_257/20230628

Article 263 of the CRR: https://www.eba.europa.eu/regulation-and-policy/single-rulebook/interactive-single-rulebook/101094#:~:text=Under%20the%20SEC-ERBA%2C%20the%20risk-weighted%20exposure%20amount%20for,applicable%20risk%20weight%20in%20accordance%20with%20this%20Article.