BlackRock Solutions Enhancements to Commercial Mortgage Backed Securities (CMBS) Model

Presentation to the Valuation of Securities (E) Task Force

National Meeting

Summer 2017

National Association of Insurance Commissioners

Executive Summary

- Blackrock Solutions (BRS) has been the NAIC's vendor for analyzing the risk of CMBS since 2010.
- BRS made enhancements to its CMBS credit model for use by all its clients in 2016.
- Testing of the new model and QA of its results was announced in 2016.
- NAIC - SSG has been evaluating these enhancements.
  - This is an analysis of these effects.
  - Preliminary results indicate that the enhanced model is somewhat more conservative than the one currently used.
- The model will be implemented for year-end 2017.

NAIC
National Association of Insurance Commissioners

NAIC Structured Securities Initiative

- BlackRock Solutions (BRS) has modeled CMBS credit risk for the NAIC since 2010, using their proprietary property and loan level credit model and Trepp cash flow waterfalls.
- The BRS framework is consistent with the best current commercial mortgage modeling and research.
- The BRS CMBS model framework used for the NAIC has been largely static since the NAIC-SSG program's inception.
- Recent enhancements to the CMBS credit model focus on better capturing property specific performance and risks through the introduction of a monte carlo tenant lease simulation.

National Association of Insurance Commissioners

BRS CMBS Model Enhancements

- Monte Carlo Simulation Framework
  - Property cash flows are now projected using a Monte Carlo simulation of tenant lease renewal and lease-up of vacant space in order to allow for the divergence of property and market level performance.
  - The probability of lease renewals is a function of projected market level vacancy.
  - Property values are determined using a discounted cash flow approach.
- Property Cash Flow Construction
  - The enhanced model uses actual reported property level financials and tenancy as the starting point of cash flow forecasting. Forecast property performance is a function of market specific rent and vacancy projections, effectuated via the lease simulation.
  - Expenses are classified as fixed or variable and modeled accordingly.

National Association of Insurance Commissioners

Estimated Results: analytical model version 2.0

- Assumptions:
  - Portfolios as of 2016 Year-end as adjusted by actual pay-downs and losses through May 31, 2017. No trading in company portfolios since year end was assumed.
  - Book adjusted carrying value (BACV) was assumed to change proportionally to par balances of bonds.
  - Assume that BACV is the same as Fair Value for each bond.
    - Specifically, we assumed that the determination of the Carrying Value Method pursuant to SSAP 43R 25(a)(ii) (which differentiates among companies which maintain an AVR and those that do not) results in the same reported BACV.
  - RBC was estimated as of May 31, 2017 and provided on a <u>pre-covariance</u> basis.

Estimated Results: Conduit, SASB & Agencies: 1.0 vs. 2.0

Deal Type	Vintage	Senior	Book Adj. Carry Value, 5/31	Book Adj. Carry Value, 5/31, %	Capital Req'd., CMBS 1.0: % of BACV Holdings	Capital Req'd., CMBS 2.0: % of BACV Holdings
Conduit	Legacy	AAA	2,527,203,081	1.79%	0.37%	0.37%
Conduit	Legacy	AM	3,269,132,012	2.31%	0.39%	0.73%
Conduit	Legacy	AJ	1,568,410,265	1.11%	1.01%	1.77%
Conduit	Legacy	Mezz	2,464,630,246	1.74%	1.32%	2.69%
Conduit	Legacy	Sub	159,081,681	0.11%	0.60%	4.70%
Conduit	Legacy Total		9,988,457,286	7.06%	0.72%	1.35%
Conduit	Post Crisis	AAA	63,124,464,947	44.59%	0.37%	0.37%
Conduit	Post Crisis	AM	11,944,344,639	8.44%	0.39%	0.39%
Conduit	Post Crisis	Mezz	18,238,426,267	12.88%	0.39%	0.53%
Conduit	Post Crisis	Sub	245,966,109	0.17%	0.39%	1.51%
Conduit	Post Crisis Total		93,553,201,962	66.09%	0.38%	0.41%
Conduit Total			**103,541,659,248**	**73.15%**	**0.41%**	**0.50%**
SnglAsset/Borr	Legacy	AAA	1,931,788,225	1.36%	0.39%	0.39%
SnglAsset/Borr	Legacy	Mezz	914,615,739	0.65%	0.70%	0.70%
SnglAsset/Borr	Legacy Total		2,846,403,964	2.01%	0.49%	0.49%
SnglAsset/Borr	Post Crisis	AAA	14,640,233,105	10.34%	0.37%	0.37%
SnglAsset/Borr	Post Crisis	Mezz	12,552,423,752	8.87%	0.38%	0.39%
SnglAsset/Borr	Post Crisis	Sub	1,768,906,333	1.25%	0.38%	1.12%
SnglAsset/Borr	Post Crisis Total		28,961,563,190	20.46%	0.37%	0.43%
SnglAsset/Borr Total			**31,807,967,154**	**22.47%**	**0.39%**	**0.43%**
Agency	Post Crisis	AAA	30,834,422	0.02%	0.40%	0.40%
Agency	Post Crisis	Mezz	4,373,833,766	3.09%	0.38%	0.43%
Agency	Post Crisis	Sub	2,497,866	0.00%	0.40%	0.40%
Agency	Post Crisis Total		4,407,166,054	3.11%	0.38%	0.43%
Agency Total			**4,407,166,054**	**3.11%**	**0.38%**	**0.43%**

- Capital increases in Conduit subordinate classes, Legacy and Post-Crisis
- Capital unchanged in SASB Legacy, increases in Post Crisis subordinate classes
- Capital increase in Agency Post Crisis Mezzanine

NAIC
National Association *of* Insurance Commissioners

Estimated Results: 1.0 vs. 2.0,
Large Loan, Reremic and Miscellaneous

Deal Type	Vintage	Senior	Book Adj. Carry Value, 5/31	Book Adj. Carry Value, 5/31, %	Capital Req'd., CMBS 1.0: % of BACV Holdings	Capital Req'd., CMBS 2.0: % of BACV Holdings
Large Loan	Legacy	Mezz	43,895,924	0.03%	0.33%	0.33%
Large Loan	Legacy Total		43,895,924	0.03%	0.33%	0.33%
Large Loan	Post Crisis	AAA	427,073,121	0.30%	0.37%	0.37%
Large Loan	Post Crisis	Mezz	588,926,553	0.42%	0.62%	1.48%
Large Loan	Post Crisis	Sub	130,543,512	0.09%	0.40%	2.01%
Large Loan	Post Crisis Total		1,146,543,186	0.81%	0.50%	1.13%
Large Loan Total			**1,190,439,110**	**0.84%**	0.49%	1.10%
ReREMIC	Legacy	AAA	9,718,444	0.01%	0.39%	0.39%
ReREMIC	Legacy Total		9,718,444	0.01%	0.39%	0.39%
ReREMIC	Post Crisis	AAA	167,727,765	0.12%	0.40%	0.40%
ReREMIC	Post Crisis	Mezz	3,429,478	0.00%	0.40%	0.40%
ReREMIC	Post Crisis	Sub	-	0.00%	0.00%	0.00%
ReREMIC	Post Crisis Total		171,157,243	0.12%	0.40%	0.40%
ReREMIC Total			**180,875,687**	**0.13%**	0.40%	0.40%
Credit Tenant			102,858,950	0.07%	0.40%	0.40%
Seasoned			284,105,315	0.20%	0.38%	0.38%
Small Loan			39,418,036	0.03%	0.39%	0.39%
Grand Total			141,554,489,554	100.00%	0.41%	0.49%

- Capital increases in Large Loan deals are concentrated in subordinate tranches
- Re-remic and miscellaneous capital unchanged

National Association of Insurance Commissioners

Estimated Transitions: Model 1.0 to Model 2.0

(% based on estimated BACV)

From 1.0 / To 2.0	No Loss / NAIC 1	NAIC 1	NAIC 2	NAIC 3	NAIC 4	NAIC 5	NAIC 6	Grand Total
No Loss / NAIC 1	96.91%	1.22%	0.31%	0.24%	0.08%	0.08%	0.01%	98.84%
NAIC 1		0.34%	0.14%	0.19%	0.11%	0.05%	0.03%	0.87%
NAIC 2			0.03%	0.03%	0.01%	0.01%	0.00%	0.08%
NAIC 3				0.02%	0.04%	0.01%	0.00%	0.07%
NAIC 4					0.04%	0.01%	0.02%	0.06%
NAIC 5						0.02%	0.01%	0.04%
NAIC 6							0.03%	0.03%
Grand Total	**96.91%**	**1.56%**	**0.48%**	**0.48%**	**0.29%**	**0.17%**	**0.10%**	**100.00%**

- Higher Capital Charge: 1.37%
- Lower Capital Charge: 0.01%
- Unchanged: 98.61%

National Association of Insurance Commissioners

Summary of Impact on CMBS Transactions

As the enhanced model better captures idiosyncratic property risk, losses are somewhat higher across vintages, with larger differences in the peak vintages (e.g. 06/07) and more recent issuance (e.g. 14/15).

- **Single Asset (Legacy and 2.0)** – No major impact; only in post crisis subordinate sector.
- **Legacy Conduits** – Bond level designation impact is concentrated in AJ and AM and mezzanine bonds from peak vintages.
  - Impact is muted given the high levels of current and expected pay downs.
- **CMBS 2.0 Conduits** – Later vintage losses moderately higher as the model enhancements better capture asset-specific risks in newly originated loans.
- Estimated Capital requirements increases are concentrated in subordinate classes of Conduit and Single Asset/Single Borrower sectors
- But most designations unchanged, only 1.4% downgraded

National Association of Insurance Commissioners

Next Steps

- The conceptual framework of the enhanced BRS CMBS model has been reviewed and vetted by NAIC-SSG.
- NAIC-SSG has completed loan and bond level QA and will continue to review model output through 2017.
- NAIC-SSG will continue to confer with VOS (E) TF on its findings in 2017.
- Implementation of the CMBS model enhancements is expected to take place for the year-end 2017 analysis.
- Look for announcements on implementation on the AVS Bulletin Board and the NAIC-SSG web homepage.