



AWG Submission to the OECD

Comparing the 2011 Aircraft Sector Understanding

and Current Market Pricing

as assessed by AWG's independent technical expert in 2015

The Aviation Working Group (AWG) participated in the stakeholders' consultations held on 20 November 2015 at the OECD (the **OECD-organized consultations**). A primary purpose of these OECD-organized consultations was to update the 2014 assessments of the relationship between the Aircraft Sector Understanding of 2011 and current commercial and capital markets, given the objective of ensuring a proper relationship between them.

To facilitate that assessment, AWG submitted materials to the OECD, and through it, to the governments participating in the Aircraft Sector Understanding of 2011. These materials included a study prepared by AWG's independent technical expert, Professor Vadim Linetsky, Ph.D. of Northwestern University.

AWG attaches this study hereto for general information. As AWG submitted these materials to the OECD on a confidential basis, by posting them on the AWG website, AWG waives that confidentiality. That waiver applies only to the materials attached hereto.

This action is based on a resolution of AWG agreed at its general meeting in London on 22 May 2014, and is taken following consultations with the OECD and Professor Linetsky.

Assessment of ASU 2011 vs. Commercial Markets Pricing in 2015*

**Vadim Linetsky, Ph.D.
Professor, Northwestern University
Independent Technical Advisor, AWG**

Discussion Document
for the OECD ASU Consultations with Stakeholders
20 November 2015, Paris

***Disclaimer:** Any opinions, findings, conclusions or recommendations expressed in this material are those of the author, Prof. Linetsky, expressed in his private individual capacity, do not necessarily reflect the views of the AWG or its individual members, Northwestern University, or any other 3rd parties, and are based on work and analysis completed to date and subject to change as additional data become available. No warranty or liability of any kind is assumed.

Executive Summary

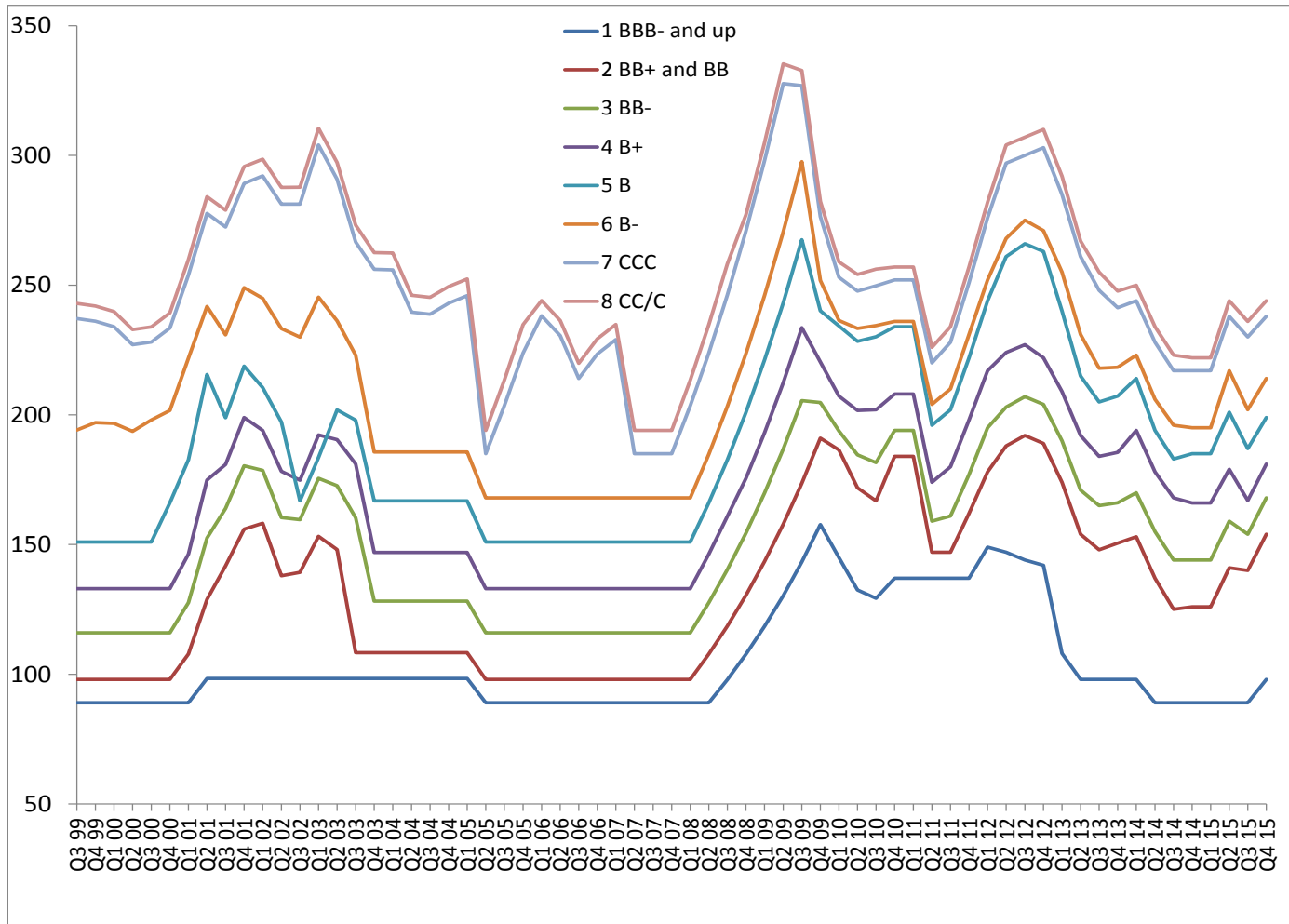
I. Comparison of ASU 2011 and Commercial and Capital Markets: 2015 Point in Time Analysis

- ASU vs. Bank loan market: according to the 4th Bank Bid Exercise (BBE 4), current ASU pricing is materially more expensive than commercial bank loan pricing for Risk Categories 1-6 (by 53 bps per annum on average across Cats 1-6 and all collateral types), while less expensive than commercial bank loan pricing for Cats 7-8 (by 16 bps per annum across all collateral types). Commercial bank financing availability remains limited in this segment of the market, as evidenced by only 3 out of 10 bidders in BBE 4 making bids for loans with average collateral to airlines in Cats 7-8.
- ASU vs. Capital markets: American Airlines 2015-1 and Air Canada 2015-1 EETCs issued in spring 2015 have more favorable terms (longer WAL, higher LTV) and materially better pricing than ASU for Cat 4 (by 81 and 82 bps per annum, respectively, after LTV adjustment based on JP Morgan Master Model current market value aircraft appraisals). American Airlines 2015-2 and United 2015-1 EETCs issued in fall 2015 have lower LTV but longer WAL and lower pricing than ASU for Cat 3 (by 29 and 27 bps, respectively, after LTV adjustment). LATAM and THY EETCs have lower LTV but longer WAL than ASU for Cat 2 and higher pricing (by 24 and 71 bps per annum, respectively, after LTV adjustment). Average advantage of EETC vs ASU across 6 deals is 21 bps.

II. Comparison of ASU 2011 and Commercial and Capital Markets: Over Time Analysis

- ASU vs. Bank loan market: According to BBE 1, in Jan 2013 ASU pricing was more advantageous for Cats 4-8 relative to commercial bank loans (more expensive for Cats 1-2 and on par for Cat 3). According to BBE 2, in Oct 2013 ASU pricing was largely on par with commercial bank loans for Cats 1-6. According to BBE 3 and 4, in 2014 and 2015 ASU pricing has stayed materially more expensive relative to bank loans for Cats 1-6 due to smaller ASU MPR downward adjustment relative to commercial pricing in the strong market (commercial pricing was little changed from BBE3 to BBE4). ASU pricing continued to stay less expensive for Cats 7-8 throughout BBE 1 to 4 (the gap has narrowed over time, but our bid sample size is limited due to majority of bidders not making bids below Cat 6).
- ASU vs. Capital markets: US airline EETC issues in 2012 to 2015 collateralized by new aircraft had better terms (higher LTV and longer WAL) and better pricing than ASU with the exception of American Airlines 2015-2 and UAL 2015-1 that had longer WAL and better pricing, but lower LTV due to their stronger cash position not necessitating issuing junior tranches. Non-US EETC issuance has been mixed so far. Air Canada 2013 and 2015 priced consistently with US airlines and materially better than ASU. BA 2013 priced consistently with ASU. LATAM 2015 priced somewhat higher than ASU. DNA 2013 and THY 2015 priced materially higher than ASU. As these were debut issues for these airlines in the EETC market, more data on non-US EETC are needed to make inferences as the market matures. Of note is a nascent market for unsecured airline bonds, with a wide spectrum of airline issuers and improving pricing in the past 3 years.

ASU 2011 MPR Adjustments: 2015 Update



- Historical simulation of ASU 2011 MPRs from Q3 1999 to Q4 2010 conducted by Dr. Linetsky. Actual MPR adjustments from Q1 2011 to Q4 2015.
- **Volatility over the full market cycle:** the range from low MPRs (in 2007) to high MPRs (financial crisis of 2008/9) has been approximately **70% to 80% of MPR**.
- **By 2014 MPRs largely returned to their (simulated) pre-2008 levels, bottomed in Q3-Q4 of 2014, and increased by about 10% of MPR on average from Q4 2014 to Q4 2015.**

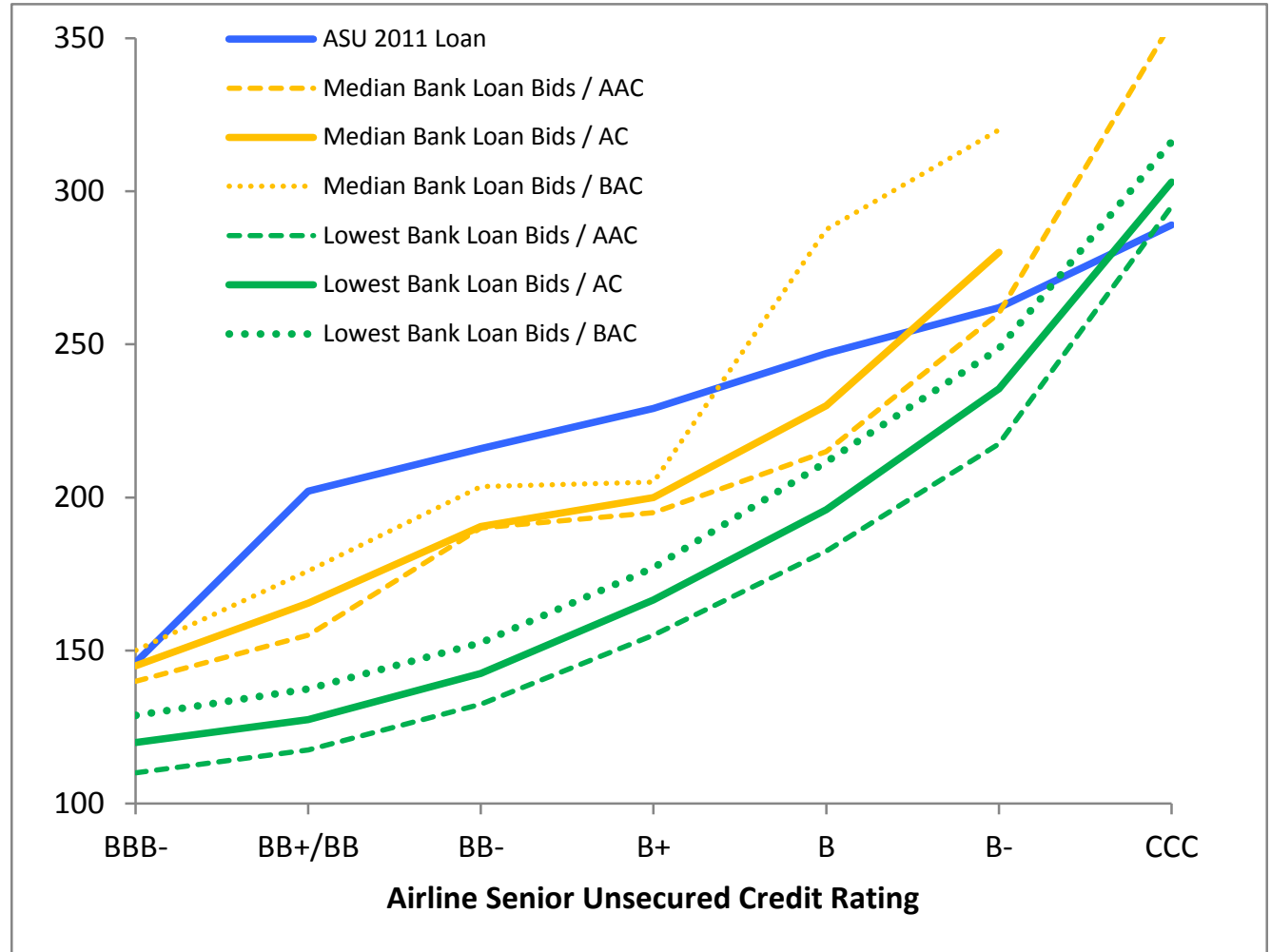
ASU 2011 vs. BBE 4

➤ **ASU 2011 Loan:** ASU 2011 MPR (Q4 2015) plus ECA Bank Funding Margin Benchmark of 48 bps.

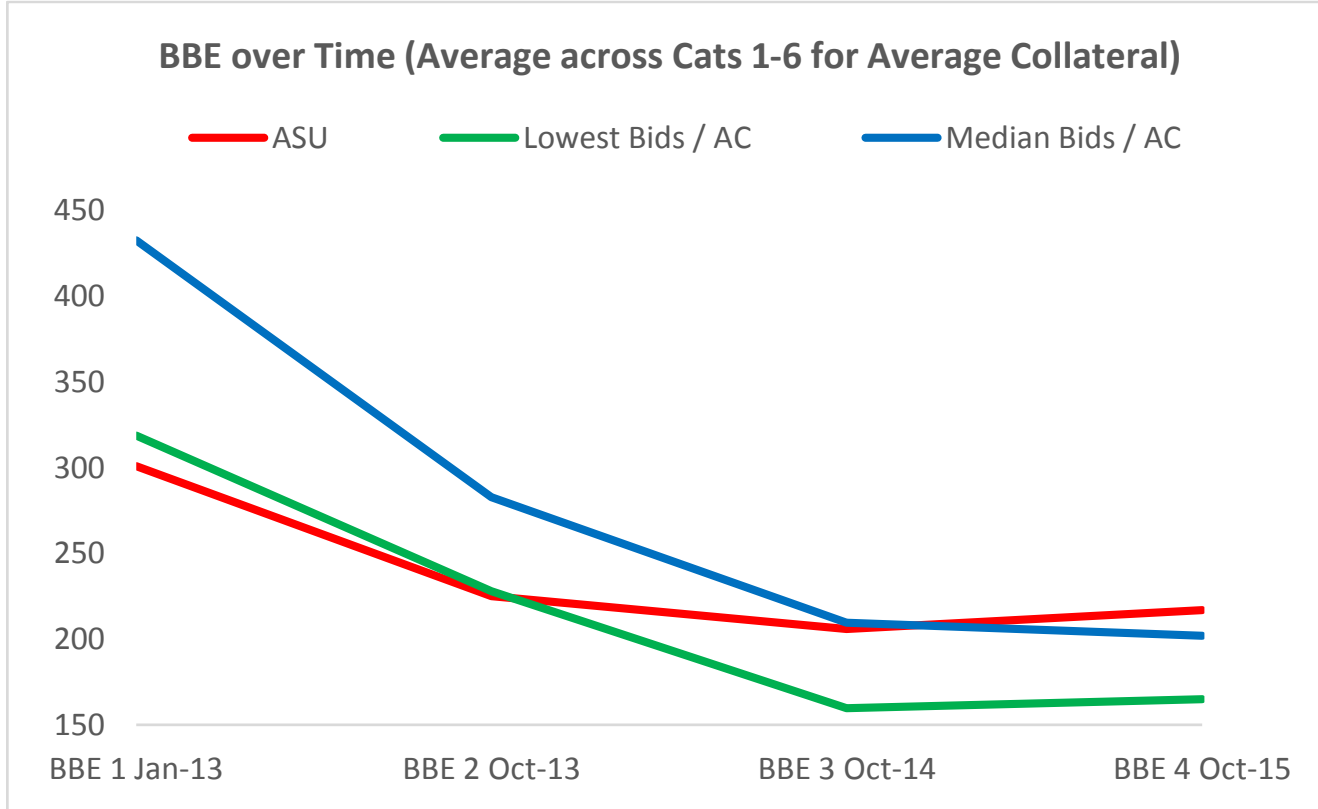
➤ **Median Bank Loan Bids / AAC, AC, BA:** Median Bids with Above Average Collateral (AAC), Average Collateral (AC), Below Average Collateral (BA)

➤ **Lowest Bank Loan Bids / AAC, AC, BA:** Average of the Two Lowest Bank Bids in Each Category

➤ **Lowest Bank Loan Bids curves (green) are materially lower than the ASU curve (solid blue) for Risk Cats 1-6, higher for Cats 7/8.**

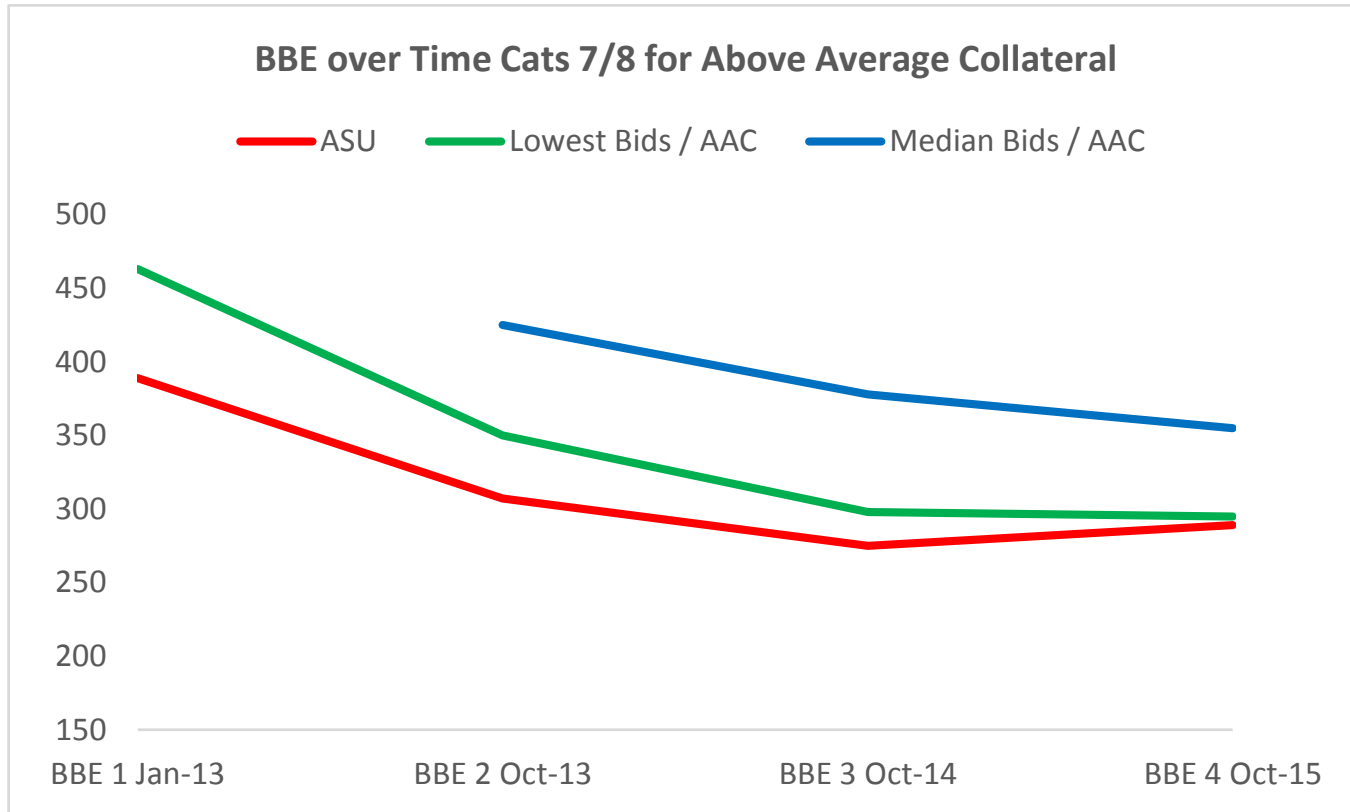


BBE vs ASU Over Time for Risk Categories 1-6



- BBE1: lowest bids slightly higher than ASU / median bids materially higher.
- BBE2: lowest bids essentially match ASU / median bids still materially higher.
- BBE 3: lowest bids materially lower than ASU / median bids essentially match ASU.
- **BBE 4: lowest bids materially lower than ASU / median bids slightly lower than ASU.**
- **ASU adjustment mechanism has been slow to track the banks in the strong market of 2014-2015.**
- Risk Categories 1-6 included in this analysis (average across Cats 1-6; AC = average collateral).

BBE vs ASU Over Time for Risk Categories 7-8



- We have limited bank pricing data for Cats 7-8 to make broad inferences for these risk categories. In BBE 4, as in BBE3, only 3 out of 10 exercise bidders made bids for loans with average collateral to airlines in Risk Categories 7-8 (4 bids for loans with above average collateral). Commercial bank financing availability remains limited in this segment of the market.
- Limited number of bids indicates that ASU pricing has remained lower in this segment than the bank market pricing during 2012-2015.
- This chart plots the average of two lowest bids and the median bid for loans with above average collateral to Cats 7-8. We do not have sufficient data for average and below average collateral to construct a similar chart. For BBE 1 we report only the average of two lowest bids and do not report the median because we only had 2 bids for Cats 7-8 in BBE 1.

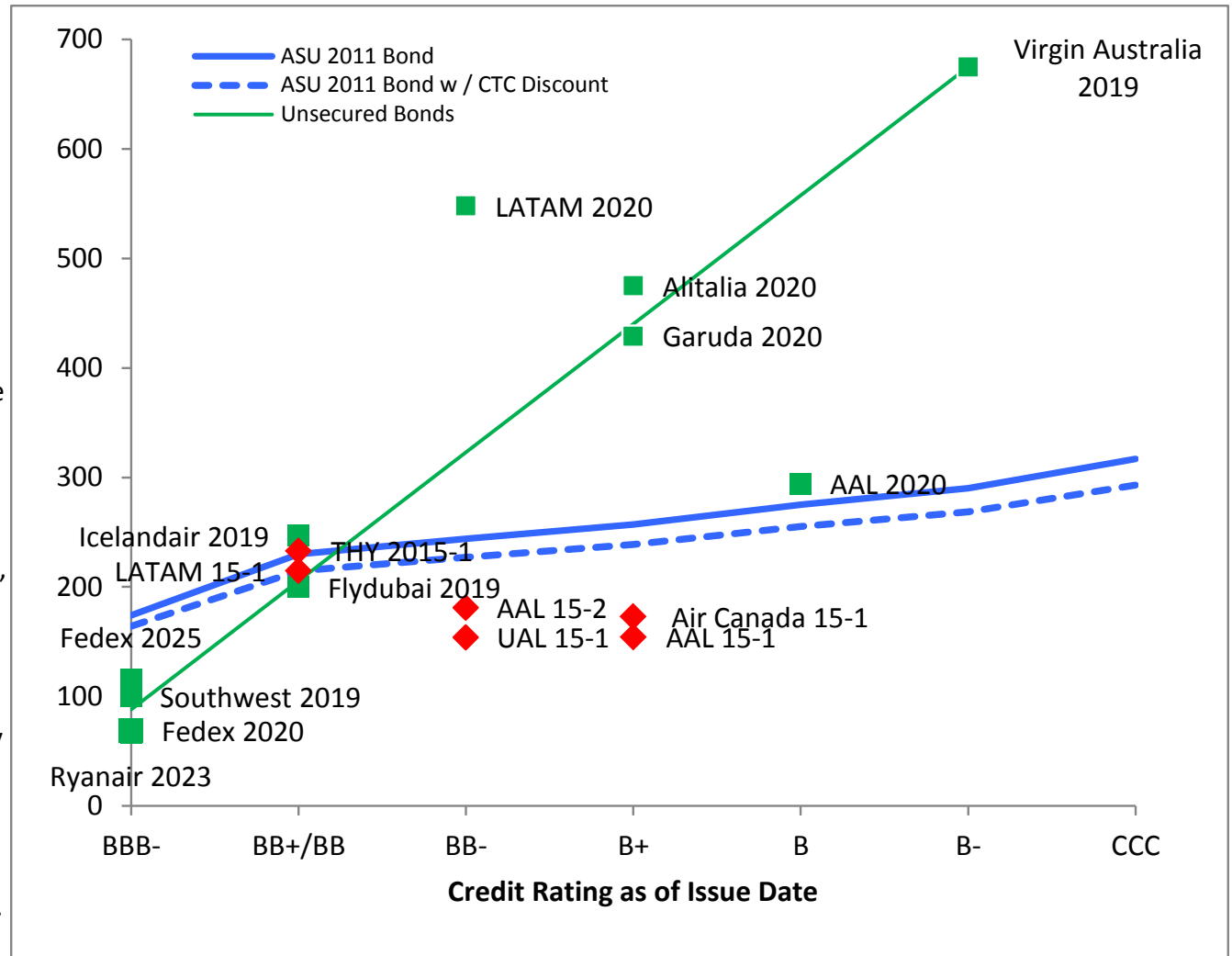
Capital Markets in 2015: EETC and Unsecured

➤ **ASU 2011 Bond:** ASU 2011 MPR (Q4 2015) plus ECA Bond Spread Benchmark over interpolated mid-swaps (BSB) of 76 bps.

➤ **Unsecured bond 2015 issuance (green squares):** spread over interpolated mid-swaps on the issue date (details on p. 26).

➤ **EETC 2015 Issuance (red diamonds):** Composite spreads over interpolated mid-swaps matched to WAL for 2015 EETC issues (AAL 15-1 and 2, AC, UAL, LATAM, THY) calculated at issuance (details on pp. 22-25). Not adjusted for LTV differences (see page 8 for adjustments).

➤ **Ratings:** For EETCs, the ratings are airline's corporate family ratings (CFR). For unsecured issues, ratings are unsecured bond ratings as of the issue date. Notes: 1) Some ratings since changed. 2) In some cases specific unsecured bond issue ratings differed substantially from corporate family ratings. 3) When Moody's and S&P disagree on the rating, we choose the higher rating to produce a more conservative comparison with the ASU. 4) Alitalia, Flydubai, Garuda and Icelandair are unrated. For the purpose of this chart we place them in ASU Risk Categories based on their market spread at issuance relative to rated issues.



ASU vs EETC in 2015: Comparison with LTV adjustments

➤ **ASU 2011: Red bars** show the cost of ECA financing for the same risk category as the airline issuing EETC on the date of EETC issue (MPR in that quarter + bond spread benchmark of 76 bps).

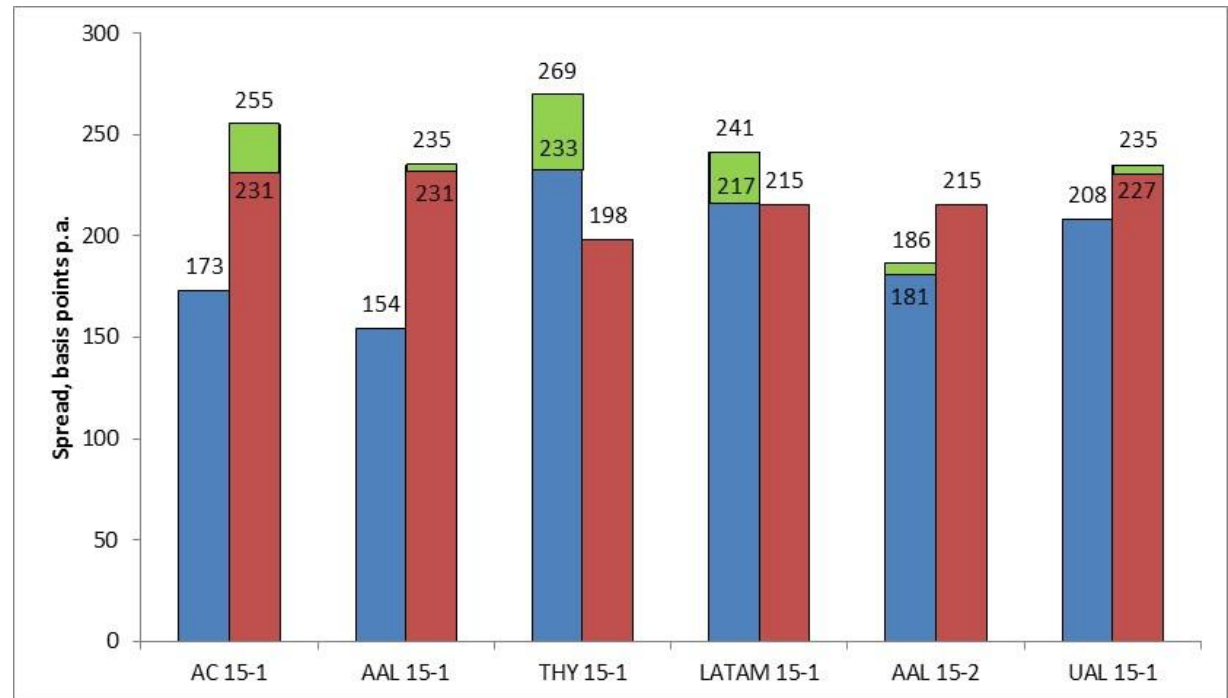
➤ **EETC: Blue bars** show composite spreads over swap rates (matched to WAL) for 2015 EETC issues calculated at issuance.

➤ **LTV Adjustments: Green bars** show cost of additional financing at the unsecured bond rate to top off to the LTV that is the greater of EETC and ASU LTVs. LTV calculations are based on JP Morgan Master Model aircraft appraisals. For AAL 15-1 and AC 15-1, EETC LTVs are greater than ASU. For these comparisons the unsecured top-offs are added to the ASU financing to arrive at the composite ASU + unsecured financing with the same LTV as EETC. For AAL 2015-2, THY 15-1 and LATAM 15-1, EETC LTVs are lower than ASU LTVs. For these comparisons the unsecured top-offs are added to the EETC to arrive at the composite EETC + unsecured financing with the same LTV as ASU.

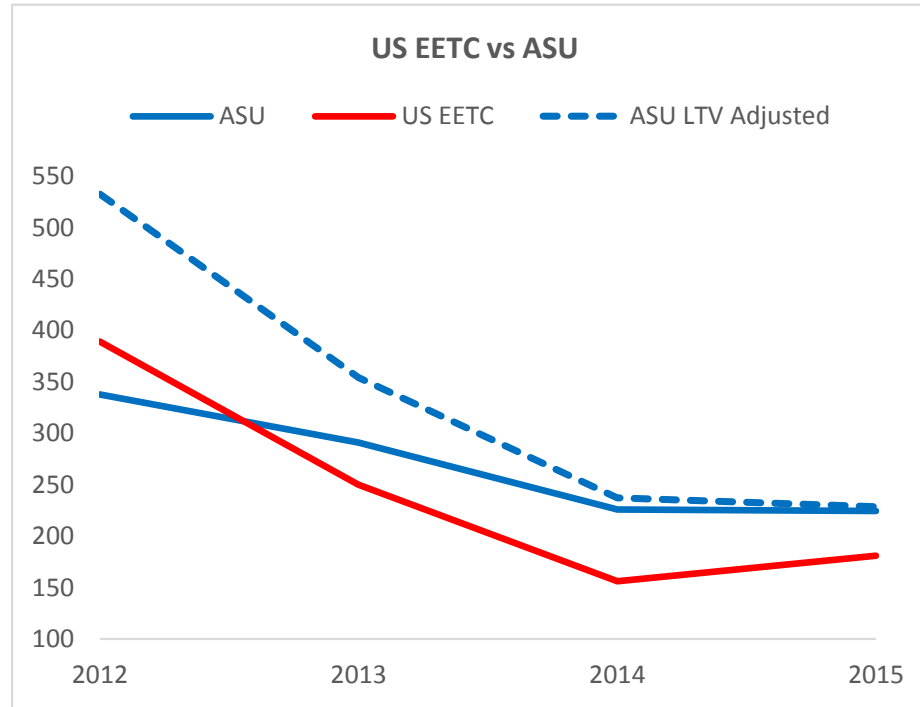
➤ **Note:** For analysis of UAL 15-1 see page 25.

➤ **Caveat:** LTV adjustments presented in this chart are hypothetical as they are based on JP Morgan appraisals. The real comparison with the ASU should be based on *net purchase prices*.

➤ **Summary: Advantage of EETC vs ASU for Air Canada 15-1, American 15-1 and 2015-2 and United 15-1 are 82, 81, 29 and 27 bps, respectively. Advantage of ASU vs EETC for LATAM and THY are 24 and 71 bps, respectively. Average advantage of EETC vs ASU across 6 deals is 21 bps.**



EETC Issuance by US Airlines vs ASU Over Time



- **US EETC:** Average composite spreads (across all tranches issued) over interpolated mid-swaps matched to WAL in basis points per annum across all EETC issues collateralized by new or predominantly new aircraft by US Airlines 2012 to 2015.
- **ASU:** For each year, average cost of ECA financing under ASU for airlines in risk categories corresponding to US airline credit ratings in that year (MPR with CTC discount plus Bond Spread Margin Benchmark).
- **ASU LTV Adjusted:** for all 2012-2015 US EETC issues except AAL 15-2 and UAL 15-1, LTVs of the combined issue (across all tranches) based on JP Morgan current market value aircraft appraisals were higher than ASU LTVs after applying risk mitigants. The LTV adjustment is performed by assuming the airline finances the remaining LTV portion at unsecured bond spreads. The LTV adjustments were large in 2012 and 2013 but are less material in 2014 and 2015 due to several reasons: 1) fewer junior tranche issuances, 2) JP Morgan current market value appraisals closer to base value appraisals in the strong market, 3) lower unsecured airline bond spreads in 2014 and 2015 resulting in lower cost of financing the unsecured portion. For AAL 2015-2 the LTV adjustment is the other way – add unsecured financing piece to the EETC to reach ASU Cat 3 80%. For UAL 15-1 analysis see page 25.
- **Caveat:** the LTV adjustment presented in this chart is hypothetical as it is based on JP Morgan appraisals. The real comparison with the ASU should be based on *net purchase prices*.
- **In 2012-2014 EETC spreads decreased faster than ASU pricing.**

Data and Details

- **I. Review of ASU 2011 Pricing: 2015 Update**
- **II. ASU 2011 vs. Commercial Markets Comparison: 4th Bank Bid Exercise (BBE 4)**
- **III. ASU 2011 vs. Commercial Markets Comparison: 2015 EETC Issuance**
- **IV. 2015 Unsecured Bond Issuance**

I. Q4 2015 vs. Q4 2014 MPR Comparison

	MPR		
Cat	Q4 2014	Q4 2015	% Change
1	89	98	9%
2	126	154	18%
3	144	168	14%
4	166	181	8%
5	185	199	7%
6	195	214	9%
7	217	238	9%
8	222	244	9%
Cat 1-8 Average:			10%

- **Minimum premium rates increased by 19 bps on average (approximately 10% of MRP).**

Spreads on ECA Guaranteed Bonds and Loans

- To assess spreads on ECA guaranteed bonds and loans that contribute to the cost of financing with ECA support in addition to MPRs, in BBE 4 we follow the methodology established in BBE 2 and 3 with two separately constructed benchmarks for the purposes of comparison with BBE and EETC.
- **ECA Bond Spread Benchmark (BSB)**: in 2015 EETC comparison exercise we use the average spread over interpolated mid-swaps matched to WAL across Ex-Im guaranteed bonds issued in 2015 and the ECGD guaranteed bond issued in 2015 as the comparison benchmark for fixed-rate capital markets transactions.
- To establish a benchmark for our Bank Bid Exercise, we conducted a separate **ECA Bank Bid Exercise**, requesting bids for margin over LIBOR on Ex-Im and EU ECA guaranteed ASU compliant loans from a panel of commercial banks active in funding ECA guaranteed loans. We received bids from four (4) banks. We use the average of two lowest bank bids over LIBOR on both Ex-Im and European ECA guaranteed loans as the comparison benchmark for our BBE. We call it **ECA Bank Funding Margin Benchmark (BFMB)**. This is an appropriate benchmark for comparing BBE with ECA bank loan financing, as it involves only bank loans.
- **Using these two separate benchmarks, we consistently compare bonds with bonds (EETC with ECA bonds) and commercial loans with commercial loans.**

II. ASU / Commercial Markets Comparison: 4th ASU / Bank Bid Exercise

- In September Dr. Linetsky conducted a **4th Bank Bid Exercise**.
- The **Bid Chart** requested bids on loans to ASU Risk Categories 1 through 7/8 (the last two risk categories combined) for three aircraft collateral types (above average, average, below average). The **Loan Term Sheet** paralleled ASU 2011 terms.
- Bid due date was 21 September 2015 for 1 December 2015 closing.
- **Ten (10) major financial institutions active in aircraft finance submitted in confidence their Bid Charts to Prof. Linetsky (10 Exercise Bidders).**
- **To facilitate comparison, exercise methodology remained the same as in the previous exercises.**
- Limitations:
 - 1) Bids are hypothetical, not actual market transactions. On one hand, a bid that is too low might not be approvable by the bank's credit committee. On the other hand, a bid that is too high would not be accepted by the customer. Nevertheless, since commercial bank loans are private transactions with confidential terms, this is the closest we can get to observing the bank loan market at a given point in time.
 - 2) The exercise considers only bank loans and does not consider alternative forms of financing, such as operating leases.
- Nevertheless, while the bids are not real transactions, the exercise bidders in many cases used their actual internal systems to generate their bids. The process has approximated the actual bidding on real transactions, in as much as a simulated exercise could.

EXERCISE BID CHART / TERM SHEET

Loan Terms				All-in Margin, bps per annum		
				Aircraft Collateral Profile		
ASU Risk Cat	Credit Rating	Maturity	LTV	Above Average	Average	Below Average
1	BBB-	12	80			
2	BB+ / BB	12	85			
3	BB-	10	85			
4	B+	10	82.5			
5	B	10	82.5			
6	B-	10	77.5			
7 & 8	CCC / CC / C	10	72.5			

- Mortgage-style amortization (fully amortized / no balloon). Quarterly payments.
- **Asset-backed:** 1) a first-priority security interest in a new aircraft; 2) in the case of a lease structure, assignment and/or a first-priority security interest in the lease payments; 3) cross-default and cross-collateralization. For purpose of 3), assume two additional aircraft of the same type will be financed by your institution over the next year.
- The LTV will be the percentage of **certified net purchase price**. The “net purchase price”, as defined in the ASU, is the price invoiced by the manufacturer or supplier, after accounting for all price discounts and other cash credits, less all other credits or concessions of any kind related or fairly attributable to the aircraft. This is in **contrast to the appraised value**.
- An “**average enforcement jurisdiction**” falls in the middle of those jurisdictions in which your institution would enter into aircraft-backed loan transactions.
- Explanation of **aircraft collateral**: several specific aircraft models were included in each of three collateral categories (above average, average, below average). Aircraft models and their placement in these categories were suggested by financial institutions participating in the bid exercise (the actual aircraft models are not disclosed in this document due to confidentiality).

EXERCISE BID CHART / TERM SHEET

- Assume that your institution agrees that the designated credit rating accurately reflects the risk of default in the subject transaction, and that no other factors are relevant to that risk. Within a given credit rating bucket, assume a midpoint according to your institution's internal metrics. Assume as follows: for Risk Category 1, a BBB- rating; for Risk Category 2, an average between BB+ and BB; for Risk Category 7/8, an average between CCC and C.
- Your bid is for an all-in margin in basis points per annum over LIBOR for a floating rate loan. For example, a bid of 250 bps means that your institution would be willing to make a floating rate loan at LIBOR + 250 bps per annum to an airline in the subject risk category. This bid should as objectively as possible represent the lowest margin your institution (i) will accept for this hypothetical loan (meaning that your institution would not do this transaction for a lower margin), and (ii) believes has a realistic chance of being accepted by the airline customer.
- Neutralization of Other factors. All other factors relating to pricing should be neutralized. For example, assume average (i) ancillary fees (such as commitment fees), (ii) relationship enhancements and gains in market share or expertise, and, thus, resulting prospects for future business, and (iii) competition from other banks seeking to secure the transactions.
- Explanation of LTVs. LTV assumptions about risk mitigants ("RM") are as follows. The first A-type RM is assumed to be maturity reduction from 12 to 10 years. This reduces maturities for Risk Categories 3 to 8 from 12 to 10 years. Second and third A-type RMs are assumed to be 5% reductions in advance rate / LTV. Each B-type RM is assumed to be equivalent to a 2.5% reduction in advance rate (this is a reasonable assumption since a security deposit equal to one quarterly interest and principal payment is acceptable as the B-type RM under the ASU). The LTVs for Risk Categories 3 to 7/8 reflect the application of the ASU required number of A and B RMs. See ASU Appendix II, Table 1 (Risk Mitigants).
- **If your financial institution would not offer a loan to a particular credit rating with particular collateral type on the terms and conditions stated herein, leave that entry blank.**

ECA Bank Funding Margin Benchmark = 48 bps

- Four (4) Exercise Bidders submitted bids for margin over LIBOR on Ex-Im and European ECA guaranteed bank loans.
- **Ex-Im** average bid: 58 bps. Average of two lowest bids: **45 bps.**
- **EU ECA** average bid: 72 bps. Average of two lowest bid: **52 bps.**
- Average margin over LIBOR across **Ex-Im and EU ECA bank loans**: 65 bps. Average of two lowest margins: **48 bps.**
- We take the average of two lowest bids in the **ECA Bank Funding Margin Benchmark** for consistency with our approach to asset backed loans in BBE.

Results of 4th Bank Bid Exercise and Comparison with 2011 ASU

- Summary table provides median bids and averages of the two lowest bids in each credit rating / collateral type.
- Median: half of the distribution is above, half is below. For a sample with an odd number of data points, median is equal to the middle value (e.g. for 7 bids, the median bid is the 4th highest bid). For an even number of data points, it is equal to the average of the two middle values (e.g. for 6 bids, the median is the average of the 3rd and 4th highest bids). Median bid represents a median bidder in the bid exercise, with half of the bidders bidding below and half bidding above.
- We require at least 4 bids for a credit rating / collateral type combination to compute the median. We require at least 3 bids to report the average of the two lowest bids.
- While the median bid best represents a typical bid made by financial institutions in our bid exercise, the average of the two lowest bids better represents a bid that an airline customer would accept, assuming the pricing were the main determinant of the airline's decision and neutralizing other factors that may be relevant. (Actual bids are not shown due to confidentiality.)
- **ECA spreads are given for comparison and are equal to Q4 2015 MPR plus ECA Bank Funding Margin Benchmark of 48 bps.**
- **The average of two lowest bids for average aircraft collateral is 24% lower than ASU MPR + ECA Bank Funding Margin Benchmark for Cats 1-6 on average, and 5% higher for Cats 7 and 8. For above average collateral, the average of two lowest bids is 30% lower than ASU for Cats 1-6 and 2% higher than ASU for Cats 7-8. For below average collateral, the average of two lowest bids is 19% lower than ASU for Cat 1-6 and 9% higher for Cats 7-8.**

Risk Category	ECA MPR+Marg.	Number of Bids	Median Bid	Median vs ECA % Difference	Average of 2 lowest bids	2 lowest vs. ECA % Difference
Above Average Collateral						
1	146	9	140	-4%	110	-25%
2	202	10	155	-23%	118	-42%
3	216	10	190	-12%	133	-39%
4	229	9	195	-15%	155	-32%
5	247	8	215	-13%	183	-26%
6	262	5	260	-1%	218	-17%
7 & 8	289	4	355	23%	295	2%
Average Collateral						
1	146	9	145	-1%	120	-18%
2	202	10	166	-18%	128	-37%
3	216	10	191	-12%	143	-34%
4	229	9	200	-13%	167	-27%
5	247	8	230	-7%	196	-21%
6	262	5	280	7%	236	-10%
7 & 8	289	3			303	5%
Below Average Collateral						
1	146	9	150	3%	129	-12%
2	202	10	176	-13%	138	-32%
3	216	10	204	-6%	153	-29%
4	229	6	205	-10%	177	-23%
5	247	5	288	16%	212	-14%
6	262	4	320	22%	249	-5%
7 & 8	289	3			316	9%

BBE 1-4 Comparison

Risk Cat	Average of 2 Lowest Bids							Median Bids						
	BBE 1 Jan-13	BBE 2 Oct-13	BBE 1 to 2 % Change	BBE 3 Oct-14	BBE 2 to 3 % Change	BBE 4 Oct-15	BBE 3 to 4 % Change	BBE 1 Jan-13	BBE 2 Oct-13	BBE 1 to 2 % Change	BBE 3 Oct-14	BBE 2 to 3 % Change	BBE 4 Oct-15	BBE 3 to 4 % Change
	Above Average Collateral							Above Average Collateral						
1	175	143	-19%	117	-18%	110	-6%	230	155	-33%	135	-13%	140	4%
2	235	170	-28%	128	-25%	118	-8%	300	205	-32%	150	-27%	155	3%
3	290	208	-28%	158	-24%	133	-16%	348	260	-25%	175	-33%	190	9%
4	335	248	-26%	154	-38%	155	1%	415	285	-31%	220	-23%	195	-11%
5	360	268	-26%	175	-35%	183	4%	525	300	-43%	250	-17%	215	-14%
6	398	268	-33%	202	-25%	218	8%	588	335	-43%	240	-28%	260	8%
7 & 8	463	350	-24%	298	-15%	295	-1%	NA	425		378	-11%	355	-6%
	Average Collateral							Average Collateral						
1	195	155	-21%	120	-23%	120	0%	230	175	-24%	145	-17%	145	0%
2	243	195	-20%	137	-30%	128	-7%	325	220	-32%	165	-25%	166	0%
3	298	223	-25%	161	-28%	143	-11%	365	255	-30%	180	-29%	191	6%
4	360	255	-29%	158	-38%	167	5%	440	318	-28%	223	-30%	200	-10%
5	380	270	-29%	178	-34%	196	10%	575	335	-42%	265	-21%	230	-13%
6	438	270	-38%	205	-24%	236	15%	663	395	-40%	280	-29%	280	0%
7 & 8	NA	375		303	-19%	303	0%	NA	455		NA			
	Below Average Collateral							Below Average Collateral						
1	225	165	-27%	128	-23%	129	1%	260	200	-23%	153	-24%	150	-2%
2	268	205	-23%	145	-30%	138	-5%	375	250	-33%	170	-32%	176	4%
3	333	260	-22%	169	-35%	153	-10%	413	303	-27%	185	-39%	204	10%
4	423	283	-33%	165	-42%	177	8%	513	310	-40%	185	-40%	205	11%
5	NA	320		186	-42%	212	14%	NA	348		215	-38%	288	34%
6	NA	343		213	-38%	249	17%	NA	425		305	-28%	320	5%
7 & 8	NA	388		311	-20%	316	2%	NA	NA		NA			

- After a material reduction in margins from BBE 2 to BBE 3, average of two lowest bids was essentially unchanged from BBE 3 to BBE 4 (increased by 1%) on average across all risk categories and collateral types.
- MPRs increased by 19 bps on average (10% of MPR) from Q4 2014 to Q4 2015.

III. ASU / Commercial Markets Comparison Exercise: 2015 EETC Issues

➤ 2015 Issues:

- American Airlines 2015-1
- American Airlines 2015-2
- Delta 2015-1 (not included in the comparison exercise due to aircraft delivered in 2013 and 2014; only EETC collateralized by new or predominantly new aircraft are included)
- United Airlines 2015-1
- Air Canada 2015-1
- LATAM 2015-1
- Turkish Airlines 2015-1

➤ For each issue we compute composite (across all tranches with the same collateral) weighted average life (WAL), LTV and spread over interpolated mid-swaps matched to WAL (at issuance).

➤ LTVs in this document are based on **JP Morgan Master Model (JPM MM) Aircraft Current Market Value (CMV) Appraisals** (April 2015 Edition pages 39-45). JPM MM CMV methodology: JPM Aircraft CMV = average of Ascend and ASG CMV appraisals adjusted based on JPM Star Rating for the aircraft (5 stars: no haircut, 4 and 3 stars: 5% haircut, 2 stars: 10% haircut, 1 star: 15% haircut; aircraft collateral in 2015 EETC issues ranged from 3 to 5 stars).

EETC / ASU Comparison Model

- Comparison with ASU 2011 ECA loans was made for each EETC issue. **To maintain consistency the same comparison model was used as in 2012 - 2014 exercises.** It was assumed that all A risk mitigants are 5% LTV reductions and B risk mitigants are security deposits approximately equivalent to 2.5% LTV reduction.
- **“Specific choice of RMs is an ECA decision.” Sources: Ex-Im Bank and European ECAs.** This comparison assumes the ECA chooses LTV reducing risk mitigants. This is a reasonable assumption in view of the fact that ASU 2011 gives ECAs the prerogative to request LTV-reducing risk mitigants. If an ECA chooses different risk mitigants in a *particular* transaction does not change the fact that it has the prerogative to insist on LTV reduction if this is what it deems appropriate. We also note that, according to our prior analysis of Loss-Given-Default and LTV profiles over the life of the ECA loan, the effects of the three A-type risk mitigants on reducing ECA’s risk, while not completely equivalent, are largely comparable.
- **ASU Risk Category Assumptions:** since ASU Risk Category ratings are confidential and not known to us, we estimate category placement of airlines as follows. If Moody’s and S&P agree on the rating, that rating is used. If Moody’s and S&P disagree by one notch, we use the higher of the two ratings (this leads to a more conservative comparison). If Moody’s and S&P disagree by two notches, we use the average of the two.
- **Comparison Model (CM)** assumes that the airline borrows the LTV difference between EETC and ASU at the unsecured bond rate.
- **ECA Bond Spread Benchmark in CM:** as discussed on pages 9 through 11 of 2013 exercise, in place of the Margin Benchmark we use ECA Bond Spread Benchmark computed as the average spread over interpolated swaps matched to WAL for ECA guaranteed bonds.
- **CM answers three questions:**
 - (1) Establish ***advantage of one form of financing over the other*** (EETC over ASU loan or ASU loan over EETC) in basis points per annum.
 - (2) Determine ***spread over swap*** for the airline to achieve the same LTV for ECA financing with additional unsecured financing as achieved under the EETC financing, if EETC LTV is higher, or vice versa.
 - (3) Establish an ***implied MPR*** to achieve equivalency with the EETC financing (composite ECA with this MPR + unsecured financing spread = composite EETC spread over all tranches issued against the same collateral aircraft fleet).

Caveats Regarding Our Comparison Model

Inputs and Methodology

- **Purchase Prices:** ASU 2011 LTVs are based on certified net **purchase prices (PP)**, not 3rd party appraisals. Comparable LTVs cannot be computed for EETCs because of **unavailability of PP. In the absence of data on PP, precise quantitative comparison between the cost of EETC and ECA financing for airlines cannot be established.** In the absence of PP, comparisons of EETC vs. ECA financing, made by us or other 3rd parties, are *mere estimates*, and as such cannot be relied upon for making precise statements, such the computation of the *actual* advantage of one type of financing over the other.
- **LTVs:** This document presents a comparison based on JPM CMVs. Other aircraft appraisals may lead to different estimates. Our reasons for choosing JPM MM are: 1) public availability, 2) comprehensive nature, covering all outstanding EETC issues, 3) consistency across different EETC issues (the same approach is used for LTV analysis of all EETCs), 4) continued support and updates as new issues become available.
- **Further simplifications:** we note that there are other differences in EETC and ECA structures beyond differences in LTV and WAL, including the presence of liquidity facility in EETC senior tranches, differences in the power of cross-collateralization and cross-default clauses based on the number of aircraft included in cross-collateral, etc. *To simplify our analysis these differences are not taken into account in our comparison model.*

ECA Bond Spread Benchmark

- We examined ECA guaranteed bonds issued since 2015:
 - **Ex-Im:** Average spread over interpolated mid-swaps matched to WAL was **61 bps**.
 - **ECGD: 90 bps** (No issues by other EU ECAs in 2015).
 - Average of Ex-Im and ECGD: **76 bps**.
- **Technical note: difference between spreads over interpolated mid-swaps matched to WAL and LIBOR-equivalent spreads**

Spreads over interpolated mid-swaps matched to WAL on a fixed-rate instrument are computed by approximating the repayment profile with a WAL-matched bullet and swapping it at the interpolated WAL-matched mid-swap rate. For a 12 year ECA bond, a more precise analysis requires swapping fixed interest on each of the 48 principal payments in the 12 year mortgage-style principal amortizing profile into LIBOR. The difference between the spread obtained via this precise calculation and the WAL-matched approximation depends on the shape of the swap curve (in particular, the difference between the front end of the curve with tenors shorter than WAL and the long end of the curve with tenors longer than WAL). In our EETC / ASU comparison exercise we consistently used spreads over interpolated mid-swaps matched to WAL for *both* ECA-guaranteed bonds and EETCs, using the same metrics on both legs (ECA bond and EETC).

2015 EETC Summary

	Issue Date	Face	WAL	Coupon	Spread	BV LTV	CMV LTV
AAL 15-1: 8 A319-112, 5 B737-823, 1 B787-8, 5 B777-323ER, 9 ERJ 175LR / AAL Moody's CFR B1 S&P B+ / ASU Cat 4							
2015-1A	19-Mar-15	\$947,778,000	8.7	3.375%	1.45%	56.9%	64.3%
2015-1B	19-Mar-15	\$266,046,000	5.5	3.70%	2.05%	72.5%	82.3%
2015-1AB		\$1,213,824,000	8.0	3.43%	1.54%	72.5%	82.3%
AAL 15-2: 3 A319-112, 9 A321-231, 3 B737-823, 5 B787-8, 1 B777-323ER / AAL Moody's CFR Ba3 SP BB- / ASU Cat 3							
2015-1AA	10-Sep-15	\$583,226,000	9	3.60%	1.47%	39%	42%
2015-1A	10-Sep-15	\$239,271,000	9	4.00%	1.87%	55%	60%
2015-1B	10-Sep-15	\$239,271,000	5.6	4.40%	2.71%	71%	77%
2015-1AA-B		\$1,061,768,000	8.2	3.85%	1.81%	71%	77%
Air Canada 15-1: 1 B787-8, 8 B787-9 / AC Moody's CFR B2, S&P B+ / ASU Cat 4							
2015-1A	11-Mar-15	\$667,370,000	9	3.60%	1.43%	54.6%	55.6%
2015-1B	11-Mar-15	\$182,010,000	6	3.875%	1.97%	69.2%	70.8%
2015-1C	11-Mar-15	\$182,010,000	5	5.00%	3.24%	84.4%	85.9%
2015-1ABC		\$1,031,390,000	7.8	3.81%	1.73%	84.4%	85.9%
THY 15-1: 3 B777-300ER / THY Moody's CFR Ba1, S&P BB+ / ASU Cat 2							
2015-1A	19-Mar-15	\$328,274,000	7.3	4.20%	2.33%	64.50%	73.1%
LATAM 15-1: 11 A321-200, 2 A350-900, 4 B787-9 / LATAM Moody's CFR Ba2, S&P BB / ASU Cat 2							
2015-1A	14-May-15	\$845,213,000	8.4	4.20%	2.07%	59.0%	62.7%
2015-1B	14-May-15	\$175,610,000	5.4	4.50%	2.77%	71.2%	76.5%
2015-1AB		\$1,020,823,000	7.9	4.25%	2.15%	71.2%	76.5%
United 15-1: 6 B737-924ER, 4 B787-9 / United Moody's CFR Ba3, S&P BB- / ASU Cat 3							
2015-1AA	2-Nov-15	\$333,652,000	9	3.45%	1.44%	38.6%	40.8%
2015-1A	2-Nov-15	\$100,000,000	7	3.70%	1.88%	50.2%	53.0%
2015-1AA-A		\$433,652,000	8.5	3.50%	1.54%	50.2%	53.0%

- CMV LTV: based on JPM Current Market Value appraisal of collateral aircraft (from JP Morgan Master Model April 2015 Edition pages 39-45). (Note: A350-900 appraisals were not available in JPM MM. We used Ascend appraisals).
- BV LTV: prospectus base value LTV.
- CMV LTV for AAL 2015-1 and Air Canada are higher than ASU, for AAL 2015-2, UAL 2015-1, LATAM and THY are lower.
- WAL: weighted average life. For all 2015 EETC issues, WAL is longer than ASU.
- Coupon: prospectus coupon. For multiple tranches blended coupon calculated as the IRR of the financing including all tranches.
- Spread: over the interpolated swap rate matched to WAL on the issue date.
- When S&P and Moody's ratings disagree (AAL), we assign ASU Risk Category based on higher rating for a more conservative comparison with the ASU.

2015 Comparison Model Results (JPM CMV Appraisal Based)

	EETC	AAL 15-1AB	AAL 15-2AA-B	AC 15-1AB	THY 15-1A	LATAM 15-1AB
	CFR Moodys/SP/ASU	B1/B+/Cat 4	Ba3/BB-/Cat 3	B2/B+/Cat 4	Ba1/BB+/Cat 2	Ba2/BB/Cat 2
EETC	Issue Date	19-Mar-15	10-Sep-15	11-Mar-15	19-Mar-15	14-May-15
	WAL	8.0	8.2	7.8	7.3	7.9
	JPM CMV LTV	82.3%	77.0%	86.0%	73.1%	76.5%
	Spread over Swap	1.54%	1.81%	1.73%	2.33%	2.15%
ASU 2011 ECA	WAL	6.7	6.7	6.7	6.7	6.7
	ASU LTV w/ RM	77.5%	80.0%	77.5%	85.0%	85.0%
	CTC Discount	YES	YES	YES	YES	NO
	MPR	1.55%	1.39%	1.55%	1.22%	1.41%
	ECA BSB	0.76%	0.76%	0.76%	0.76%	0.76%
	All-in Spread	2.31%	2.15%	2.31%	1.98%	2.17%
EETC vs ASU 2011 ECA Analysis	EETC LTV - ASU LTV	4.80%	-3.00%	8.45%	-11.90%	-8.50%
		ECA + Unsec	EETC + Unsec	ECA + Unsec	EETC + Unsec	EETC + Unsec
	Composite Spread	2.35%	1.86%	2.55%	2.69%	2.41%
	EETC vs ASU Spread	0.81%	0.29%	0.82%	-0.71%	-0.24%
	Equivalent MPR	0.70%	1.10%	0.64%	1.93%	1.65%

- MPR (at time of EETC issue) for comparison with US EETC include 10% CTC discount (CTC comparable to Section 1110).
- ASU LTV is with risk mitigants.
- ASU All-in Spread = MPR + ECA BSB.
- AAL 2015-1 and Air Canada ECA + Unsecured: assumes the airline finances the difference between the higher EETC and lower ASU LTVs at the unsecured bond rate. Composite Spread is calculated based on the composite ASU ECA-supported + unsecured financing. AAL 2015-2, LATAM and THY EETC + Unsecured: assumes the airline finances the difference in ASU and EETC LTVs at the unsecured rate. Composite Spread is calculated on the composite EETC + unsecured financing. For AAL, AC and LATAM we use market spreads over swaps on their respective unsecured bonds. Since THY does not have outstanding unsecured bonds we use the average of LATAM and Garuda unsecured spreads as the proxy for THY unsecured spread, as these are the two emerging market airline unsecured issues the closest in timing to THY.
- For AAL 2015-1 and Air Canada EETC vs. ASU Spread: Composite Spread for ECA supported loan + unsecured bond minus EETC spread. For AAL 2015-2, LATAM and THY EETC vs. ASU Spread: ECA supported loan minus Composite Spread for EETC + unsecured bond.
- Equivalent MPR (with CTC discount if applicable) is such MPR that equalizes ECA financing and EETC financing.
- For UAL 15-1 analysis see page 25.

EETC / ASU Comparison Analysis

- **American Airlines 2015-1, 2015-2 and Air Canada 2015-1** EETC spreads over mid-swaps unadjusted for LTV differences are materially lower (by 77, 34 and 58 bps, resp.) than the ASU 2011 pricing at the time of issue. American 2015-1 and Air Canada 2015-1 have longer WAL and higher LTV than the ASU 2011 terms for Category 4. American 2015-2 has longer WAL but slightly lower LTV than the ASU 2011 terms for Category 3 (after ratings upgrade by Moody's and SP over the summer). According to our Comparison Model based on LTVs computed from J.P. Morgan Master Model current market value aircraft appraisals on the EETC side and the application of LTV-reducing risk mitigants on the ECA side, our estimates of overall EETC advantage over ECA financing under the ASU are 81, 29 and 82 bps per annum for American 2015-1, 2015-2 and Air Canada 2015-1, respectively.
- **United Airlines 2015-1** EETC has a novel structure with a super senior AA tranche, a bullet senior tranche A, and no B and C tranches. Mezzanine and junior tranches were not issued due to the strong cash position of United Airlines not necessitating raising additional funds. The AA / bullet A structure is not directly comparable to ASU loans and other EETCs in our comparison exercise. According to Thomas Cahill, Managing Director, Morgan Stanley, a sole structuring agent of the United 2015-1 EETC, if United were to issue a conventional structure with A, B and C tranches, the pricing would have likely been as follows: AA: 3.45%, conventionally amortizing A tranche: 3.875% coupon (12 year final maturity / 9 year average life; the coupon is greater than the 3.70% coupon on the actually issued bullet tranche due to conversion of the bullet bond to an amortizer), B tranche: 4.375% coupon (with 70.3% base value prospectus LTV, 8 year final maturity / 6 year average life), C tranche: 5 year bullet with 5.25% coupon with 80% base value prospectus LTV. We used this indicative pricing on the conventional structure with tranches A, B and C for our comparison of United 15-1 with the ASU pricing. Following our Comparison Model methodology in assessing this hypothetical conventional structure with 80% base value LTV, United 15-1 EETC advantage vs. ASU for Category 3 is 27 bps p.a. (composite spread over swaps matched to WAL is 208 bps vs 227 bps ASU spread (= 151 Cat 3 4Q 2015 MPR with CTC + 76 bps bond spread benchmark); 80% EETC base value LTV corresponds to 84.6% LTV based on JPM current market value appraisal for aircraft in UAL 15-1, adding 8 bps to ASU financing cost, pricing the 4.6% top-off at the C tranche spread). This result is closely in line with our assessment of the American Airlines 15-2 (29 bps advantage of AAL 15-2 over ASU for Cat 3).
- **LATAM 2015-1** EETC spread over mid-swaps unadjusted for LTV differences is approximately the same as ASU Cat 2. LATAM EETC LTV is lower than ASU Category 2 LTV. After LTV adjustment, LATAM 2015-1 EETC financing would be 24 bps per annum more expensive than ECA financing under ASU 2011.
- **THY 2015-1** EETC spread unadjusted for LTV differences is 35 bps higher than the ASU Cat 2 with CTC discount. THY EETC LTV is lower than ASU Category 2 LTV. After LTV adjustment, THY 2015-1 EETC financing would be 71 bps per annum more expensive than ECA financing under ASU 2011.
- **Caveat:** The precise numerical relationship between EETC and ECA financing is predicated on the proxy for the aircraft net purchase price used for the LTV calculation. Different aircraft appraisals will lead to different LTVs and different numerical comparison conclusions.

IV. Unsecured Airline Bond Issuance

Airline	Moody's / S&P	Issue Month	Amount, M	Term	Coupon	Spread
Southwest	Baa2 / BBB	Nov 2014	USD 300	5 year	2.75%	MS + 100
Virgin Australia	B3 / B-	Nov 2014	USD 300	5 year	8.50%	MS + 675
Flydubai	NR / NR	Nov 2014	USD 500	5 year	3.78%	MS + 200
Icelandair	NR/ NR	Dec 2014	USD 23.7	5 year	4.25%	MS + 247
Fedex	Baa1 / BBB	Jan 2015	USD 700	10 year	3.20%	MS + 115
Fedex	Baa1 / BBB	Jan 2015	USD 400	5 year	2.30%	MS + 69
American Airlines	B3 / B	Feb 2015	USD 500	5 year	4.63%	MS + 294
Ryanair	NR / BBB+	Mar 2015	Euro 850	8 year	1.13%	MS + 67
Garuda	NR / NR	May 2015	USD 500	5 year	5.95%	MS + 429
Latam	Ba3 / BB-	Jun 2015	USD 500	5 year	7.25%	MS + 548
Alitalia	NR/ NR	Jul 2015	Euro 375	5 year	5.25%	MS + 475

- Includes USD, EUR issues with term between 5 and 10 years
- Amounts in millions of issue currency
- Spread over mid-swaps at issuance
- Ratings are unsecured issue ratings as of the issue date (Note: some ratings since changed; in some cases unsecured issue ratings differed substantially from corporate family ratings)