

Market Insights

Sector Intelligence | Aircraft Index Report

Feb. 24, 2023

This report does not constitute a rating action

Key Takeaways

- The Russia-Ukraine conflict put increased pressure on the aviation sector in 2022 resulting in a steep decline in issuance of new aircraft ABS transactions in comparison to 2021 and further straining some outstanding transactions.
- In 2022 we lowered our ratings on 17 classes from eight transactions. The negative rating actions were mainly attributed to exposure to airlines domiciled in Russia and/or Ukraine as well as deterioration of collateral performance, if any, due to the impact of COVID-19 on lease collections and disposition values.
- For 2023 we expect manufacturer delays to continue to support strong demand for older aircraft and that the ongoing recovery in long-haul passenger traffic will put pressure on the supply of widebody aircraft. Although we observe gradual improvements in performance for the ABS transactions, the recovery may lag as many transactions are still behind their targeted scheduled principal amounts on one or more notes.

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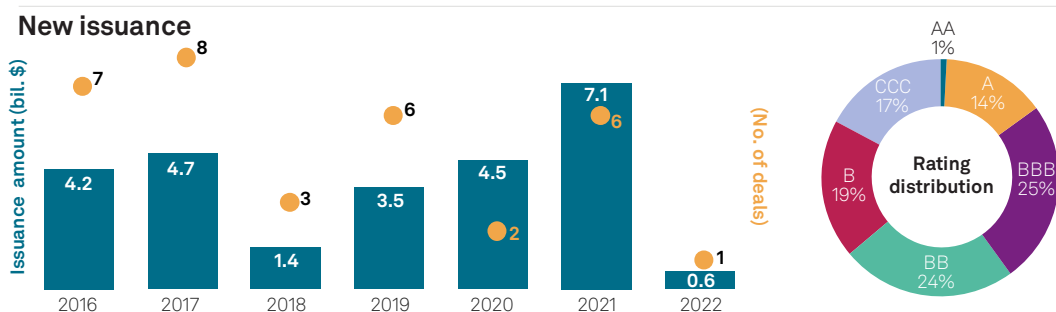
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32 Deal count

\$13.6 bil. Outstanding balance

1 New deals in 2022

\$609 mil. New issuance in 2022



Rating activity in 2022

Prior rating category	Downgrades (notches)			Affirmations	Grand total
	Three and above	Two	One		
AA	1				1
A	2			6	8
BBB	3			7	10
BB	2		1	7	10
B	2	1	4	4	11
CCC		1		3	4
Grand total	10	2	5	27	44

Source: S&P Global Ratings.

Aircraft ABS Overview

Aircraft and aircraft engine lease securitizations are typically backed by a diversified pool of assets generating lease rental payments and residual value at the end of their useful life. A typical portfolio consists of 10 or more aircraft or aircraft engines, which are leased to airlines globally.

This report covers 32 S&P Global-rated transactions with 92 ratings outstanding as of Feb. 15, 2023, including securitizations of aircraft loans and business jets. The portfolio statistics provided herein include only the aircraft lease ABS transactions issued post 2008. The data is as of the December 2022 payment date report. We also note that two transactions--FAN Engine Securitization Ltd. (redeemed in December 2022) and S-JETS 2017-1 Limited (redeemed in January 2023)--are no longer outstanding as of the date of this report and therefore are excluded from all statistics and tables.

2022 Year In Review

The aviation sector was beginning to recover from the COVID-19 pandemic when the Russia-Ukraine conflict erupted in February 2022. The conflict put increased pressure on the sector resulting in a steep decline in issuance--fueled further by the rising interest rate environment in the second half of 2022--of new aircraft ABS transactions in comparison to 2021. Although the impact of the conflict was not as severe as that of the pandemic, it negatively affected some transactions with exposure to Russia and/or Ukraine. The affected transactions had to report a total loss--mainly on aircraft previously on lease to a Russian airline--and are now awaiting proceeds from the insurance claims, the timing and amount of which is highly uncertain.

In 2022 we rated one new transaction, Business Jets Securities 2022-1 LLC. The transaction is backed by a portfolio of business jet aircraft and the related loans and leases.

Although we observed a moderate increase in rental collections in 2022 on outstanding transactions--as the sector shifted away from power-by-the-hour agreements and rent deferrals--and substantial repayments on the notes, many transactions remain behind their targeted scheduled principal payments on one or more notes and continue to defer interest on the junior notes. This, along with stressed valuations from appraisers increased LTV ratios across the capital structure, resulting in several multi-notch downgrades.

Portfolio Statistics

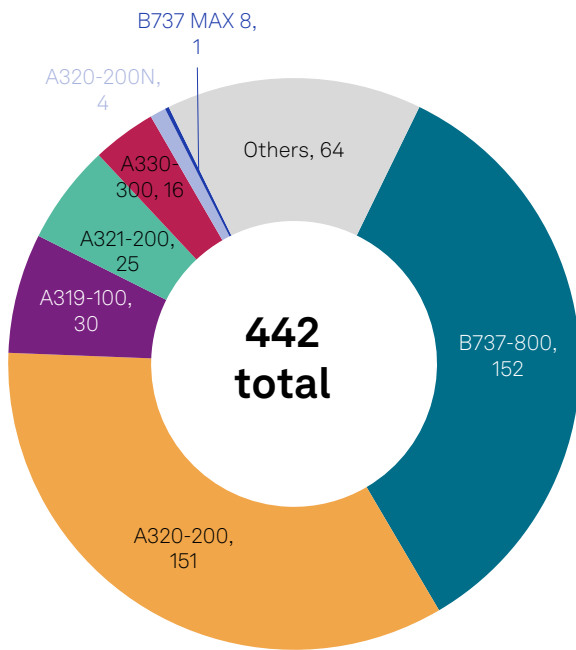
In the following section, we track some of the key portfolio metrics for the outstanding aircraft lease ABS transactions issued post 2008. The data is as of the December 2022 payment date report. It does not include any engines that remain in the portfolio after the associated airframe was sold.

Aircraft Types

Single aisle aircraft, also referred to as narrowbody aircraft, represent the largest share of the global fleet. According to Boeing's Commercial Market Outlook 2022-2041, single aisle aircraft will represent 70% of the fleet in 2041. These aircraft are generally easier to re-lease given the lower transition costs and large number of airline operators in comparison to twin-aisle widebody aircraft. Approximately 90% (by count) of aircraft in the outstanding transactions are narrowbody, and approximately 68% (by count) of the aircraft in the transactions are either B737-800s or A320-200s.

Chart 1

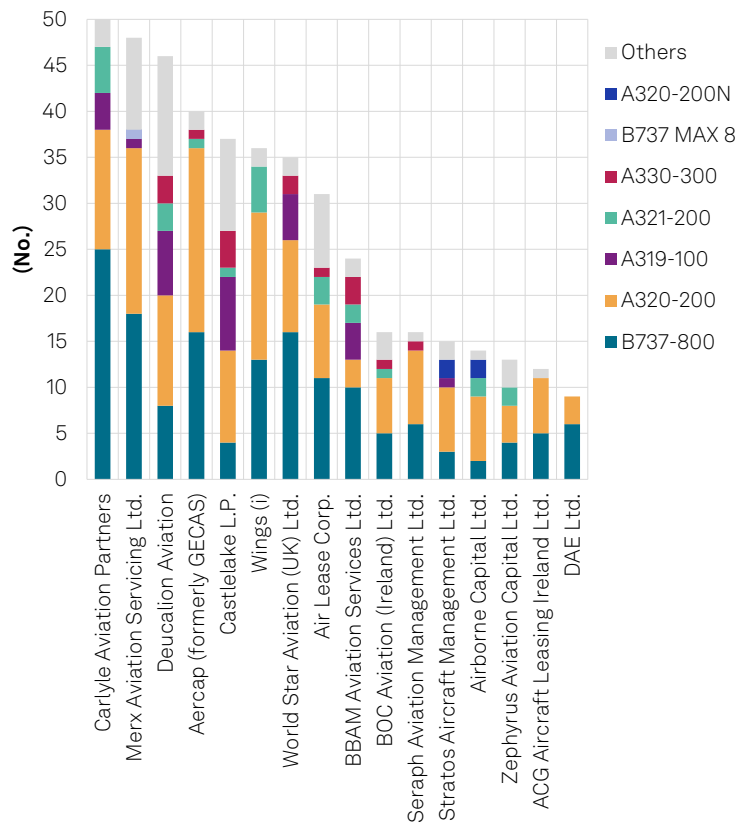
Major Aircraft Types (No.)



Source: S&P Global Ratings.

Chart 2

Distribution Of Aircraft Types Across Servicers



(i)Wings Capital Partners LLC and Wings Capital Partners Aviation Ireland Ltd. DAE--Dubai Aerospace Enterprise. GECAS--GE Capital Aviation Services Ltd. Source: S&P Global Ratings.

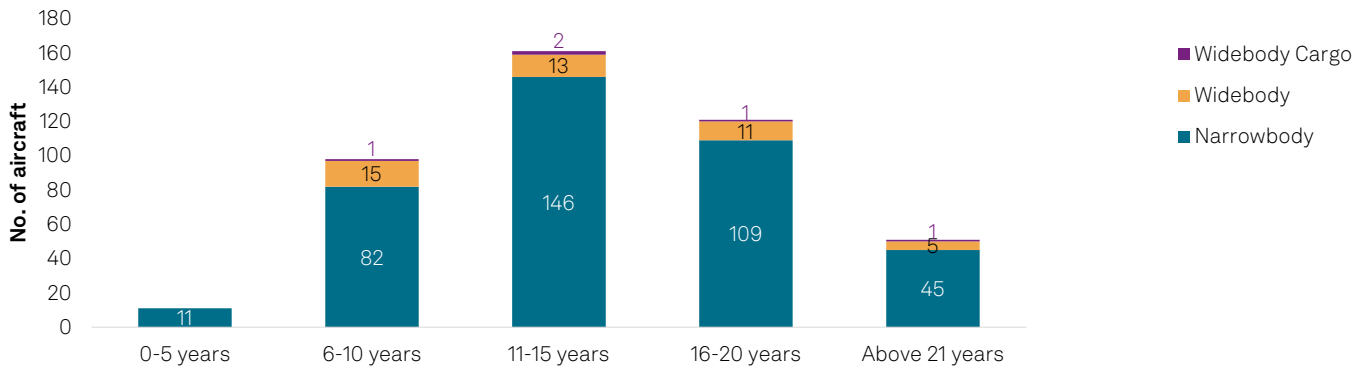
Aircraft Age

The average aircraft age in the transactions currently outstanding is approximately 13 years and ranges between seven and 20 years, as of Dec. 31, 2022.

Prior to the COVID-19 pandemic, transactions rated by S&P Global Ratings were typically backed by pools of mid-life to end-of-life aircraft. More recent transactions, specifically those issued in 2021, generally consisted of younger aircraft on lease to airlines with a stronger credit profile. Typically, airlines that lease aging aircraft or aircraft engines historically tend to be of lower credit quality and located in lower-rated jurisdictions.

Chart 3

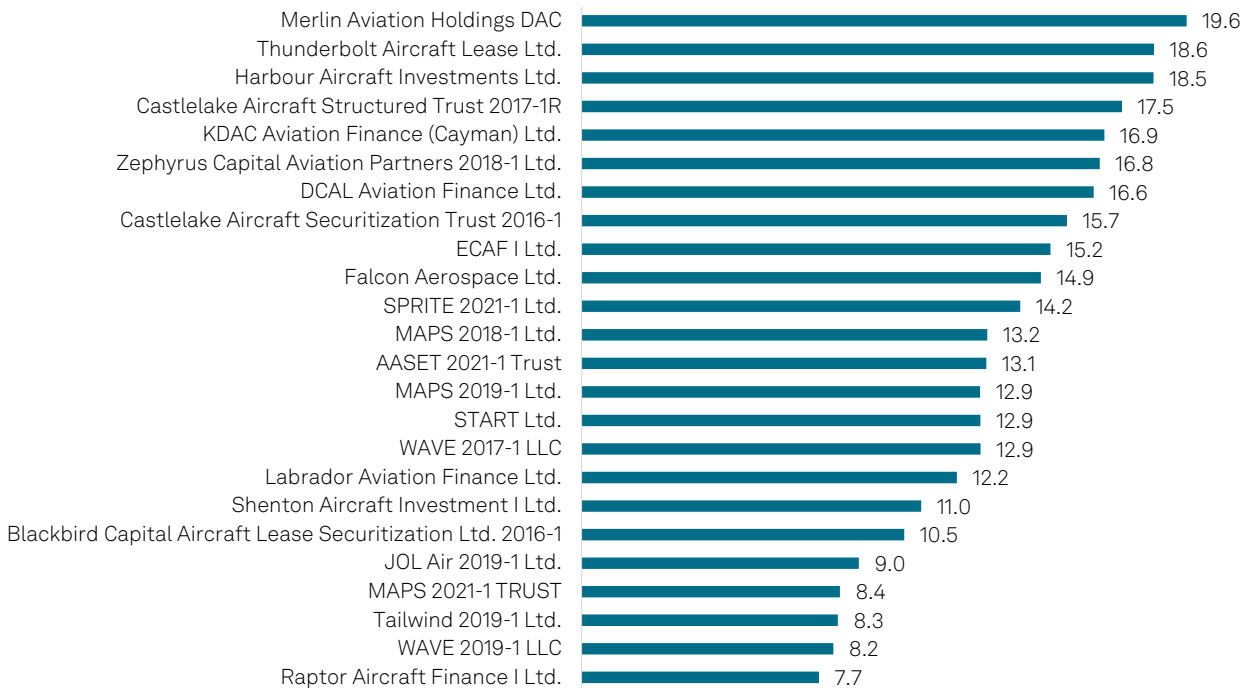
Age Of Portfolio By Airframe Type



Source: S&P Global Ratings.

Chart 4

Average Portfolio Age By Issuer



The age is calculated as of Dec. 31, 2022, as a simple average age of all the aircraft in a portfolio. Source: S&P Global Ratings.

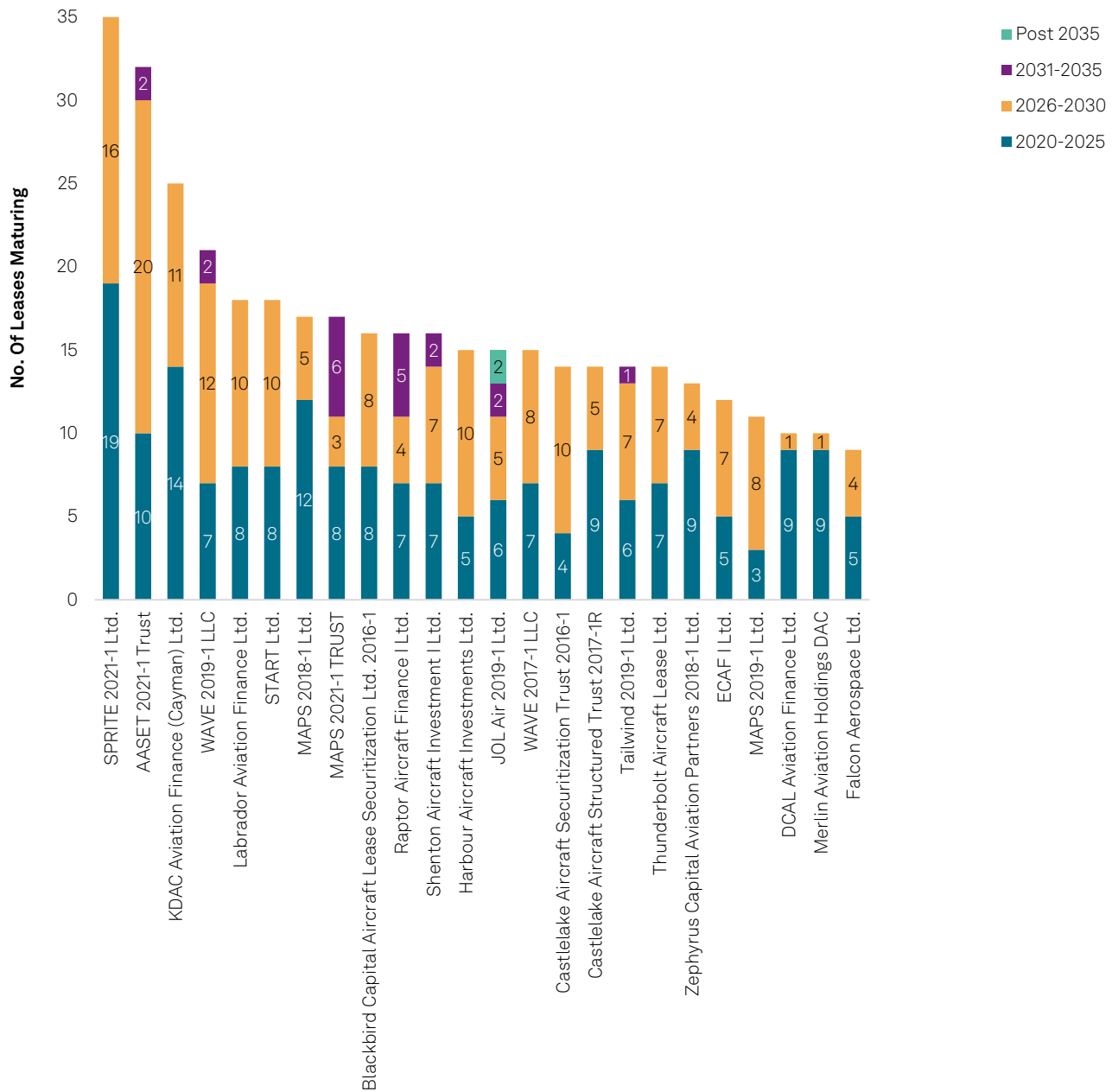
Lease Expiry

A concentration of lease maturities in a short time frame may expose a transaction to potential re-leasing risks. For example, transaction cash flows may be significantly reduced if the re-leasing event occurs during an industry downturn when lessors typically have less bargaining power. Most servicers on S&P Global Ratings-rated transactions have indicated that they typically begin planning for re-leasing events 12-24 months in advance of the lease maturity.

Chart 5 below shows lease maturities in our outstanding rated transactions.

Chart 5

Distribution Of Lease Expiry By Issuer

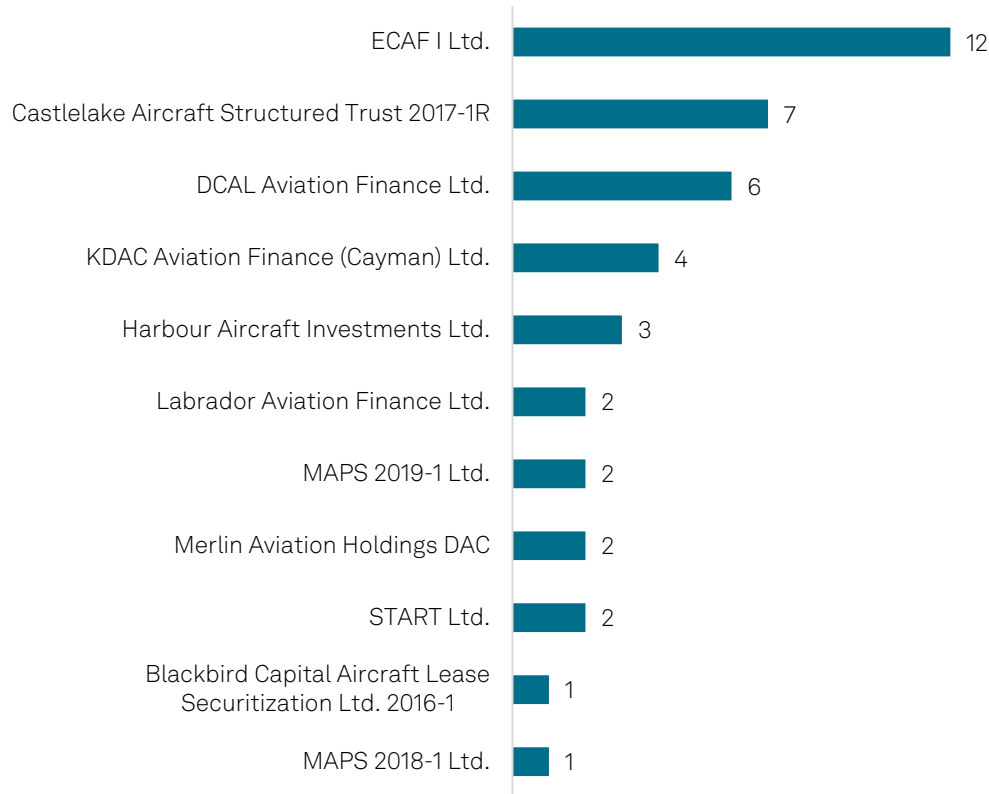


Source: S&P Global Ratings.

Chart 6 lists the number of off-lease aircraft for relevant transactions. These may also include aircraft present in the portfolio that are treated as a total loss following the Russia-Ukraine conflict. The data does not include off-lease engines, if any, after the associated airframe was sold.

Chart 6

Distribution Of Off-lease Aircraft Across Issuers



Source: S&P Global Ratings.

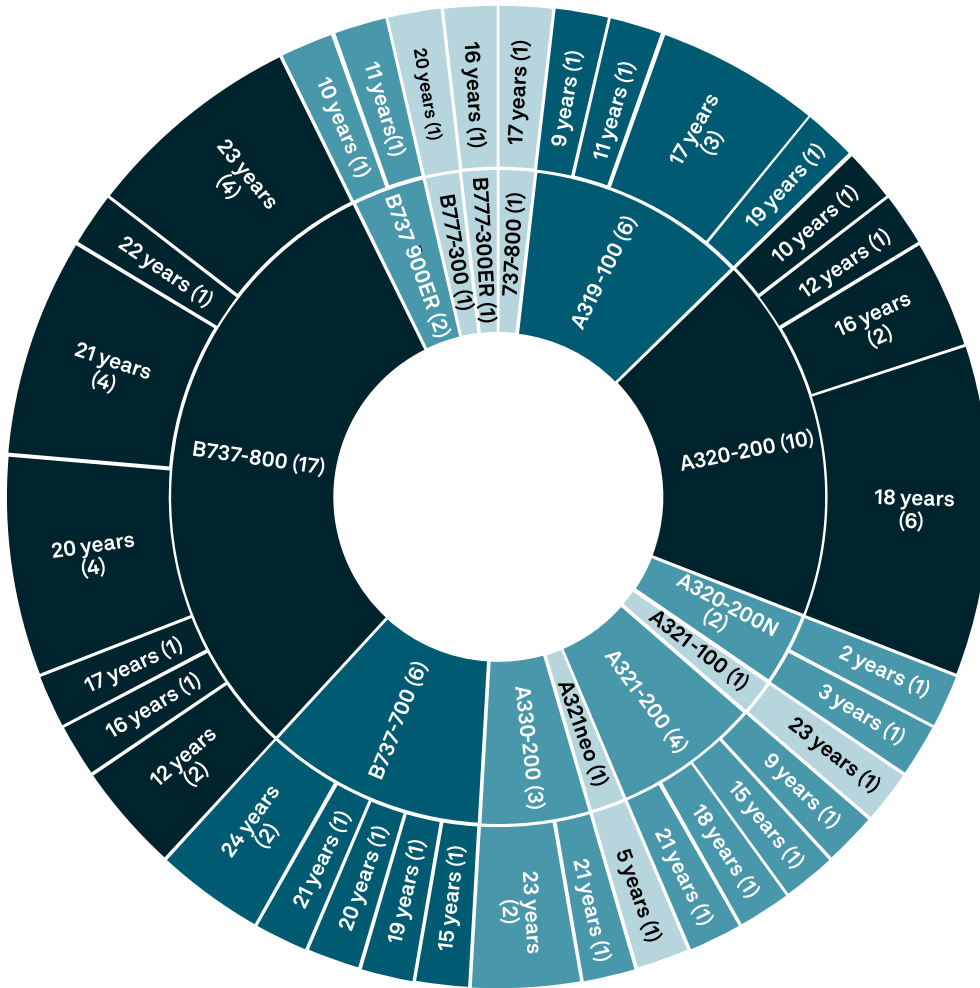
Sale Activity In 2022

Most aircraft in the ABS pools are generally sold towards the end of their useful life. In the current market where there is a general shortage of engines, the airframe is often sold and the engine is re-leased. This generally occurs when there is sufficient green time left in the engines. Older B737-800 aircraft are frequently purchased as part of a freighter conversion strategy by the new owner. Lessors may also consider selling an aircraft at the end of a lease to avoid making investments to upgrade the cabin and inflight entertainment required for a new lessee, or to avoid a major and expensive maintenance event.

Chart 7 provides details on all aircraft disposition activities observed in 2022 by aircraft type and age at the time of disposition. Since the sale date is not readily available in all cases, we are assuming that all sales are as of June 30, 2022, solely for age calculation purposes.

Chart 7

Aircraft Sales By Age (No. of sales)



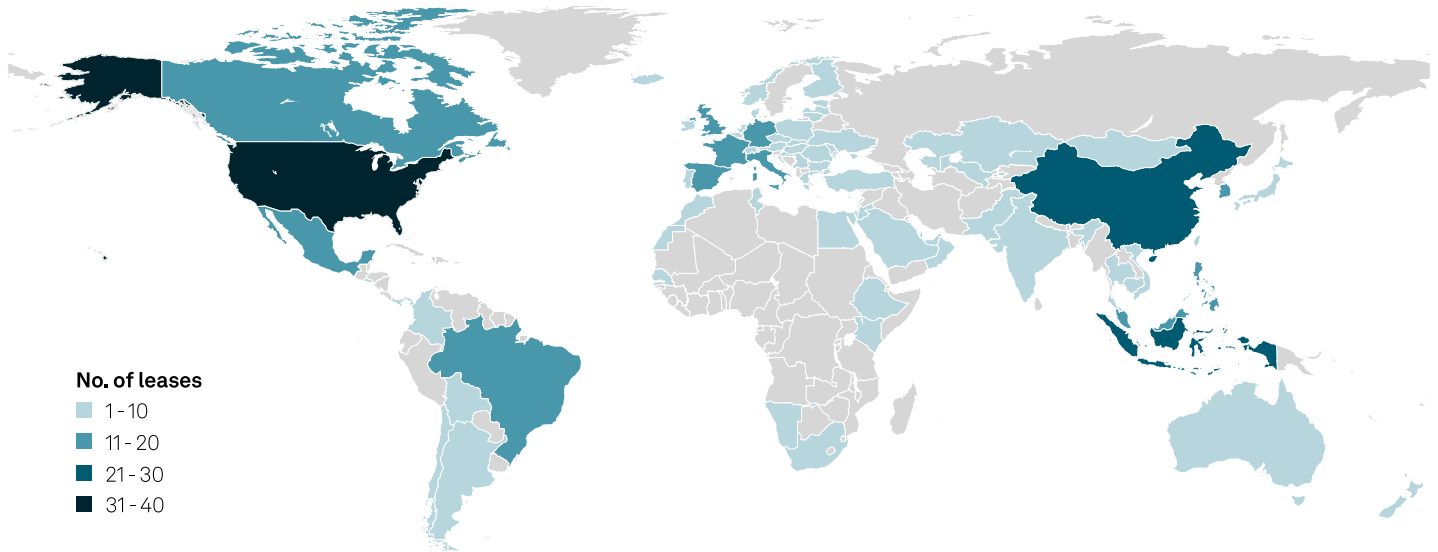
Data as of Dec. 31, 2022. Source S&P Global Ratings.

Lessee Diversification

Geographic diversification of lessees is an important factor for transactions. The country and region in which an aircraft is operated may impact maintenance expenses and intervals, the length of time to repossess an aircraft upon default, or the ability to re-lease an aircraft, among other things. The chart below shows the number of aircraft on lease in each country.

Chart 8

Count Of Lease By Country



Source: S&P Global Ratings.

2022 Rating Actions

In 2022 we lowered our ratings on 17 classes from eight transactions. The negative rating actions were mainly attributed to exposure to airlines domiciled in Russia and/or Ukraine as well as deterioration of collateral performance due to the impact of COVID-19 on lease collections and disposition values. See the Related Research section for links to our 2022 rating actions and related publications.

Table 1

Rating Actions

Deal name	Downgrades (notches)			Affirmations	Grand total
	Three and above	Two	One		
PK Air 1 LP				10	10
AASET 2021-1 Trust				3	3
Castlelake Aircraft Structured Trust 2017-1R	2		1		3
DCAL Aviation Finance Ltd.			1	2	3
ECAF I Ltd.		1	2		3
Falcon Aerospace Ltd.				3	3
Harbour Aircraft Investments Ltd.				3	3
MAPS 2019-1 Ltd.	1		1	1	3
MAPS 2021-1 Trust				3	3
Thunderbolt Aircraft Lease Ltd.	3				3
JOL Air 2019-1				2	2
Labrador Aviation Finance Ltd.	2				2
Rotor Engines Securitization Ltd.	1	1			2
RASPRO Trust 2005	1				1
Grand total	10	2	5	27	44

Source: S&P Global Ratings.

2023 Outlook

In 2023, we expect manufacturer delays to continue to support strong demand for older aircraft. The reopening of China's borders has stimulated commercial passenger travel in the region and will likely continue to drive demand for aircraft as airlines seek additional capacity. Given the current rising interest rate environment, we expect new lease rates will continue to gradually increase. The imbalance between supply and demand for narrowbody aircraft will also support rising lease rates. We expect the ongoing recovery in long-haul passenger traffic to put pressure on the supply of widebody aircraft, including older, less fuel-efficient aircraft.

For the rated ABS transactions, although we observe gradual improvements in performance through increased collections and repayments on the notes, we expect recovery to lag. Given the significant

accrued unpaid scheduled principal amounts, it might take longer for some of the transactions to catch up to the targeted amortization schedule on one or more notes, resulting in increased LTVs across the capital structure as aircraft appraisals also continue to be stressed.

Year In Review

Debt service coverage ratios for most transactions issued prior to 2020 are below 1.15x, the early amortization threshold. However, interest on the non-deferrable senior notes has been paid in a timely manner and there have been no drawings on the senior liquidity facilities. In 2022, the outstanding transactions received approximately \$1.6 billion in principal repayments.

There are two transactions with anticipated repayment dates (ARDs) in 2023. After the ARD, the classes may be repaid sequentially until they are fully paid off and there will be a step-up in interest rate on the ABS notes that is paid at a subordinated step in the priority of payments (non-payment of this step-up interest is not an event of default). In most transactions, the ARD related turbo payment step in the priority of payments is subordinated to scheduled principal payments. As transactions remain behind on their scheduled principal payments, there may be a lag before the classes benefit from the turbo payments. Our rating on the notes addresses the timely payment of interest and ultimate payment of principal by their legal final maturity.

Table 2

Transaction Details

Deal name	Class	Balance as of (\$ mil.)		Amount paid in 2022 (\$ mil.)	Rating as of		DSCR as of			ARD
		12/31/22	1/1/22		12/31/22	1/1/22	Dec. 2022	Jan. 2022	Coupon (%)	
AASET 2021-1 Trust	A	509.53	609.17	99.64	A (sf)	A (sf)			2.950	
	B	116.52	121.89	5.37	BBB- (sf)	BBB- (sf)	0.61	1.56	3.800	October-28
	C	67.12	70.92	3.81	B (sf)	B (sf)			5.822	
Blackbird Capital Aircraft Lease Securitization Ltd. 2016-1	AA	47.96	77.08	29.13	AA (sf)	AA (sf)			2.487	
	A	347.08	374.38	27.29	A (sf)	A (sf)	0.85	1.60	4.213	December-24
	B	41.63	42.81	1.18	BBB (sf)	BBB (sf)			5.682	
Blade Engine Securitization Ltd.	A-1	38.22	64.51	26.29	CCC (sf)	CCC (sf)	N/A	N/A	LIB_1MO +1.00	N/A
	A-2	9.98	16.84	6.86	CCC (sf)	CCC (sf)			6.363	
Business Jet Securities 2020-1 LLC	A	182.34	296.09	113.75	A (sf)	A (sf)			2.981	
	B	31.06	46.43	15.37	BBB (sf)	BBB (sf)	1.39	1.43	3.967	November-26
	C	12.00	20.63	8.63	BB (sf)	BB (sf)			7.142	
Business Jet Securities 2021-1 LLC	A	377.88	453.66	75.78	A (sf)	A (sf)			2.162	
	B	58.18	67.57	9.38	BBB (sf)	BBB (sf)	1.53	1.45	2.918	April-27
	C	28.41	37.40	8.99	BB (sf)	BB (sf)			5.067	
Business Jet Securities 2022-1 LLC	A	468.89	512.81	43.92	A (sf)	A (sf)			4.455	
	B	55.16	60.33	5.17	BBB (sf)	BBB (sf)	1.20	N/A	5.192	June-28
	C	30.63	35.82	5.19	BB (sf)	BB (sf)			6.413	
Castlelake Aircraft Securitization Trust 2016-1	A	32.50	149.53	117.02	A (sf)	A (sf)	1.24	1.24	4.450	August-23
	B	8.00	28.74	20.74	BBB (sf)	BBB (sf)			6.150	
Castlelake Aircraft Structured Trust 2017-1R	A	189.98	251.62	61.64	BBB- (sf)	A (sf)			2.741	August-28
	B	53.65	59.91	6.26	B+ (sf)	BBB (sf)	1.30	1.84	3.924	

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	C	40.39	46.50	6.11	CCC+ (sf)	B- (sf)			6.500	
DCAL Aviation Finance Ltd.	A-1	220.44	240.27	19.83	B- (sf)	B (sf)			4.213	
	B-1	38.22	38.22	-	CCC+ (sf)	CCC+ (sf)	0.54	0.47	5.072	February-22
	C-1	12.41	11.83	(0.58)	CCC (sf)	CCC (sf)			4.750	
ECAFI Ltd.	A-1	54.68	61.19	6.51	CCC+ (sf)	B- (sf)			3.473	
	A-2	409.74	447.70	37.96	CCC+ (sf)	B- (sf)	0.26	0.17	4.947	June-22
	B-1	80.22	85.20	4.99	CCC- (sf)	CCC+ (sf)			5.802	
Falcon Aerospace Ltd.	A	80.68	92.38	11.69	A- (sf)	A- (sf)			4.581	
	B	21.24	21.24	-	BBB- (sf)	BBB- (sf)	0.80	(0.64)	6.300	February-24
	C	9.75	9.75	-	BB (sf)	BB (sf)			8.500	
Harbour Aircraft Investments Ltd.	A	172.00	222.08	50.08	BB- (sf)	BB- (sf)			4.000	
	B	29.80	34.82	5.02	B (sf)	B (sf)	0.25	0.75	5.682	November-24
	C	46.66	43.08	(3.58)	CCC (sf)	CCC (sf)			8.000	
JOL Air 2019-1	A	338.76	377.67	38.90	BBB+ (sf)	BBB+ (sf)	1.35	0.93	3.967	May-26
	B	66.94	66.94	-	BB+ (sf)	BB+ (sf)			4.948	
KDAC Aviation Finance (Cayman) Ltd.	A	348.56	407.36	58.81	BB- (sf)	BB- (sf)			4.212	
	B	73.90	73.90	-	B (sf)	B (sf)	0.23	0.41	5.926	December-24
	C	49.11	45.63	(3.49)	CCC+ (sf)	CCC+ (sf)			7.385	
Labrador Aviation Finance Ltd.	A	390.23	423.95	33.72	BB+ (sf)	BBB+ (sf)	0.57	0.74	4.300	January-24
	B	81.76	81.76	-	B (sf)	BB+ (sf)			5.682	
MAPS 2018-1 Ltd.	A	228.16	277.01	48.85	BBB+ (sf)	BBB+ (sf)			4.212	
	B	34.84	36.93	2.09	BB+ (sf)	BB+ (sf)	0.19	1.11	5.193	May-25
	C	30.92	29.00	(1.92)	B+ (sf)	B+ (sf)			6.413	
MAPS 2019-1 Ltd.	A	173.01	245.53	72.52	BBB+ (sf)	BBB+ (sf)			4.458	
	B	64.38	65.53	1.15	BB (sf)	BB+ (sf)	0.22	0.33	5.560	March-26
	C	29.90	27.77	(2.12)	CCC+ (sf)	B+ (sf)			7.385	
MAPS 2021-1 Trust	A	327.81	401.57	73.76	A (sf)	A (sf)			2.521	
	B	65.28	69.45	4.17	BBB (sf)	BBB (sf)	0.25	1.85	3.425	June-28
	C	41.27	46.65	5.39	BB (sf)	BB (sf)			5.437	
Merlin Aviation Holdings DAC	A	72.66	102.61	29.95	BB+ (sf)	BB+ (sf)			4.500	
	B	9.96	9.34	(0.63)	B+ (sf)	B+ (sf)	1.02	0.37	6.500	December-23
	C	7.43	6.83	(0.60)	CCC+ (sf)	CCC+ (sf)			8.500	
PK Air 1 LP	A-E	150.62	156.39	5.77	A(sf)	A (sf)			EUR_3MO+1.25	
	A-F	1,194.66	1,194.66	-	A(sf)	A (sf)			LIB_3MO+1.25	
	A-R	848.12	749.30	(98.82)	A(sf)	A (sf)			LIB_3MO+1.25	
	B-E	22.00	22.00	-	BB (sf)	BB (sf)	N/A	N/A	EUR_3MO+1.50	N/A
	B1-F	488.67	465.03	(23.64)	BBB+(sf)	BBB+ (sf)			3.000	
	B2-F	426.30	405.68	(20.62)	BBB-(sf)	BBB- (sf)			3.750	
	C-E	62.00	62.00	-	BB-(sf)	BB- (sf)			EUR_3MO+1.90	
	C-F	251.31	239.16	(12.16)	BB-(sf)	BB- (sf)			5.000	

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	D-E	84.50	84.50	-	B-(sf)	B-(sf)			EUR_3MO +3.25	
	D1-F	42.82	40.75	(2.07)	B-(sf)	B-(sf)			7.000	
Raptor Aircraft Finance I Ltd.	A	389.81	412.61	22.80	BB+(sf)	BB+(sf)			4.213	
	B	90.57	90.57	-	B+(sf)	B+(sf)	0.05	0.06	5.193	August-26
	C	51.86	48.41	(3.45)	CCC(sf)	CCC(sf)			6.900	
RASPRO Trust 2005	B	95.54	95.54	-	A-(sf)	AA-(sf)	N/A	N/A	LIB_3MO +0.925	NA
Rotor Engines Securitization Ltd.	A	61.82	72.55	10.72	CCC+(sf)	B+(sf)	N/A	N/A	5.750	N/A
	B	6.99	7.92	0.94	CCC(sf)	B-(sf)			7.150	
Shenton Aircraft Investment I Ltd	A	294.92	334.22	39.30	BBB+(sf)	BBB+(sf)	0.28	0.36	4.750	N/A
	B	28.18	32.52	4.33	BB+(sf)	BB+(sf)			5.750	
Sprite 2021-1 Ltd.	A	437.24	481.32	44.09	A-(sf)	A-(sf)			3.750	
	B	79.33	87.33	8.00	BBB-(sf)	BBB-(sf)	1.82	N/A	5.100	October-28
	C	50.71	59.29	8.57	B+(sf)	B+(sf)			8.835	
START Ltd.	A	230.93	278.38	47.45	BBB+(sf)	BBB+(sf)			4.089	
	B	87.86	87.86	-	BB(sf)	BB(sf)	0.53	0.44	5.315	May-25
	C	29.53	27.57	(1.96)	B(sf)	B(sf)			6.899	
Tailwind 2019-1 Ltd.	A	297.54	328.86	31.32	BBB(sf)	BBB(sf)			3.967	
	B	57.33	59.70	2.36	BB(sf)	BB(sf)	0.70	0.90	5.193	November-26
	C	40.25	37.53	(2.71)	B-(sf)	B-(sf)			7.000	
Thunderbolt Aircraft Lease Ltd.	A	127.15	146.29	19.14	BBB(sf)	A(sf)			4.212	
	B	44.58	44.85	0.26	B(sf)	BBB-(sf)	0.46	0.80	5.750	April-24
	C	11.65	11.18	(0.47)	CCC+(sf)	BB(sf)			4.500	
Turbine Engines Securitization Ltd.	2013-1A	120.36	131.10	10.74	BBB+(sf)	BBB+(sf)	N/A	N/A	5.125	March-26
	2013-1B	13.39	14.04	0.64	BB+(sf)	BB+(sf)			6.375	
WAVE 2017-1 LLC	A	218.20	280.31	62.10	BBB(sf)	BBB(sf)			3.844	
	B	45.99	45.99	-	BB(sf)	BB(sf)	0.22	0.47	5.682	November-24
	C	22.43	20.99	(1.44)	B(sf)	B(sf)			6.656	
WAVE 2019-1 LLC	A	450.26	491.74	41.48	BBB+(sf)	BBB+(sf)			3.597	
	B	78.29	78.29	-	BB+(sf)	BB+(sf)	0.49	0.43	4.581	September-27
	C	45.66	42.83	(2.83)	B(sf)	B(sf)			6.413	
Zephyrus Capital Aviation Partners 2018-1 Ltd.	A	172.12	220.50	48.38	BBB-(sf)	BBB-(sf)	0.63	0.64	4.605	October-25

Note: Negative amounts reflect the deferral of interest and capitalization into the principal balance of the notes. For PK Air 1 LP, it means additional drawings under the revolving loans. DSCR--Debt service coverage ratio. ARD--Anticipated repayment date. N/A--Not applicable. Source: S&P Global Ratings.

Related Research

Date	Title
Nov-11-2022	Three Ratings Affirmed From Harbour Aircraft Investments Ltd.
Nov-4-2022	RASPRO Trust 2005 Class B Notes Rating Lowered
Oct-19-2022	Various Rating Actions Taken On 11 Classes From Four Aircraft ABS Transactions
Oct-4-2022	Request For Comment: Global Aircraft ABS: Methodology And Assumptions
Jun-13-2022	A Deal-By-Deal Look Behind The Aircraft ABS Rating Actions As Of June 13, 2022
Jun-13-2022	Various Actions Taken On 28 Ratings From Seven Aircraft ABS Transactions; Off CreditWatch Negative
May-17-2022	Business Jet Securities 2022-1 LLC Notes Assigned Ratings
May-5-2022	Business Jet Securities 2022-1 LLC Notes Assigned Preliminary Ratings
May-5-2022	Presale: Business Jet Securities 2022-1 LLC
Mar-15-2022	Impact Of The Russia-Ukraine Conflict On Aircraft ABS Securitizations
Mar-1-2022	S&P Global Ratings Reviews Aircraft ABS Exposure To Russian And Ukrainian Airlines
Feb-15-2022	Seven Ratings Lowered From Three Aircraft And Aircraft Engine ABS Transactions

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