

Aerospace & Defence Update

Aftermarket tracker - Engine thrust vs'19 range bound

Industry Overview

Weekly average engine thrust vs 2019 range bound

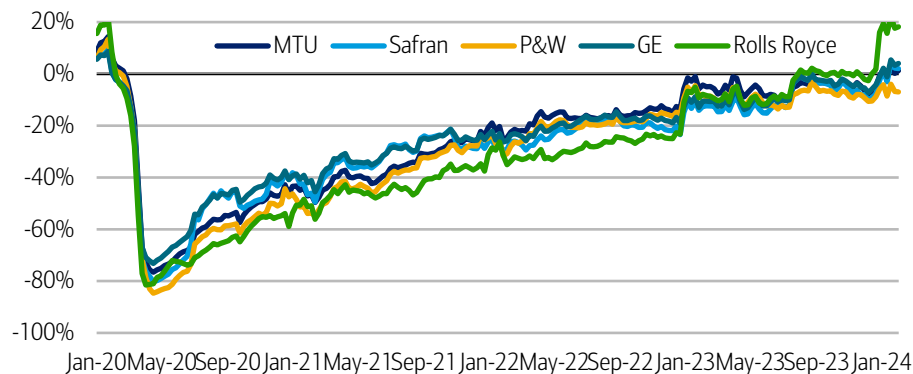
Weekly avg. engine thrust vs'19 shows range bound movement by +/-1ppt over last week with MTU reporting the highest improvement by +1ppt followed by +0.8ppts and +0.6ppts improvement in GE and Rolls-Royce weekly avg. thrust vs 2019 and P&W and Safran weekly avg. thrust vs'19 reporting a decline by -0.2ppts each at the opposite end.

MTU weekly average thrust vs 2019 improved by +1ppt to +1.2% this week vs +0.2% last week. Similarly, GE weekly average thrust vs 2019 improved by +0.8ppts to +4.1% this week, vs +3.3% last week driven by GE90 and GENX-2B. Rolls-Royce weekly avg. thrust vs'19 improved by +0.6ppts to +18.2% this week, vs +17.6% last week driven by improvement in weekly avg. thrust vs'19 of Trent 700, Trent 900, Trent 7000 and XWB.

P&W weekly average thrust vs 2019 declined by -0.2ppts to -7% this week, vs -6.8% last week driven by decline in PW2000 and PW4000, offsetting +1.6ppts improvement in PW1100G. Safran weekly average thrust vs 2019 fell by -0.2ppts to +2.1% this week, vs +2.3% last week driven by -2.7ppts decline in CFM56-7B weekly average thrust vs 2019 to -6.3% this week, vs -3.6% last week.

Exhibit 1: Average weekly engine thrust vs 2019 across engine OEMs

Weekly average engine thrust vs 2019 show range bound movement by +/-1ppt WoW



Source: BofA Global Research, Flightradar24

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Narrowbody weekly avg. thrust vs'19 declined by -1.1ppts to +4.2% this week, vs +5.3% last week while Widebody and Freighters weekly avg. thrust vs'19 improved by +1.4ppts and +1.1ppts to +6.9% and -15.8% this week, vs +5.5% and -16.9% last week resp.

15 February 2024

Equity
Europe
Aerospace & Defence

Benjamin Heelan >>
Research Analyst
MLI (UK)
+44 20 7996 5723
benjamin.heelan@bofa.com

Ronald J. Epstein
Research Analyst
BofAS
+1 646 855 5695
r.epstein@bofa.com

Andrew Obin
Research Analyst
BofAS
+1 646 855 1817
andrew.obin@bofa.com

Virginia Montorsi >>
Research Analyst
MLI (UK)
+44 20 7996 1146
virginia.montorsi@bofa.com

Carlos Iranzo Peris >>
Research Analyst
MLI (UK)
+44 20 7995 3016
carlos.iranziperis@bofa.com

NB = Narrowbody

WB = Widebody

QTD = Quarter to Date

MTD = Month to Date

YTD = Year to Date

YoY = Year on Year

WoW = Week on Week

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Engine Thrust across families

We provide below details around blended thrust performance since 1Q20 vs 2019 baseline across engine OEMs & engine categories.

Engine OEMs – MTU, Safran, P&W, GE, Rolls Royce

Exhibit 2: Engine thrust vs 2019 across engine OEMs

All OEMs are now >90% vs FY19

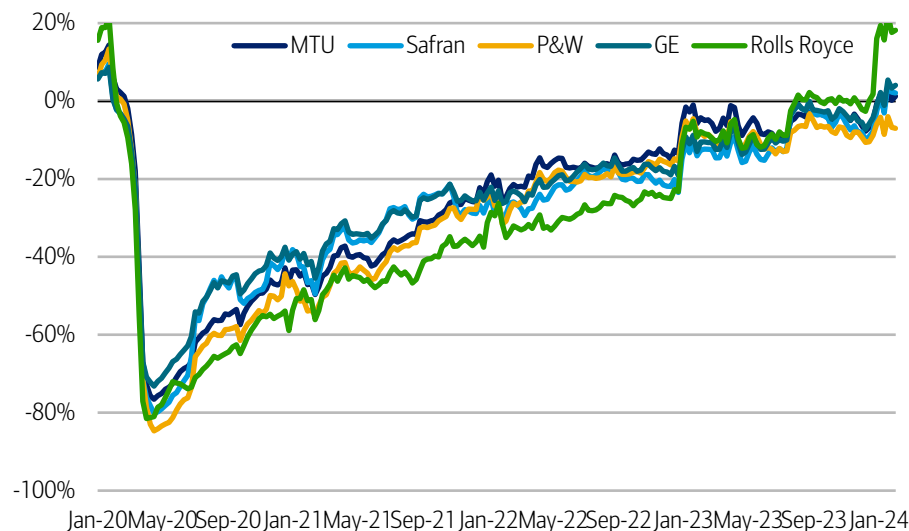
	MTU	Safran	P&W	GE	Rolls Royce
1Q20 vs 2019	-1%	-6%	-4%	-6%	-3%
2Q20 vs 2019	-72%	-76%	-80%	-68%	-76%
3Q20 vs 2019	-57%	-50%	-61%	-49%	-67%
4Q20 vs 2019	-49%	-46%	-53%	-43%	-57%
1Q21 vs 2019	-44%	-41%	-50%	-39%	-50%
2Q21 vs 2019	-40%	-35%	-43%	-33%	-46%
3Q21 vs 2019	-34%	-27%	-36%	-28%	-43%
4Q21 vs 2019	-26%	-26%	-28%	-24%	-37%
1Q22 vs 2019	-21%	-27%	-26%	-24%	-31%
2Q22 vs 2019	-16%	-23%	-19%	-20%	-31%
3Q22 vs 2019	-16%	-19%	-19%	-17%	-26%
4Q22 vs 2019	-14%	-21%	-16%	-18%	-24%
1Q23 vs 2019	-4%	-13%	-8%	-11%	-8%
2Q23 vs 2019	-6%	-13%	-10%	-11%	-9%
3Q23 vs 2019	-5%	-5%	-8%	-4%	-2%
4Q23 vs 2019	-5%	-7%	-8%	-4%	0%
YTD vs 2019	1%	0%	-6%	2%	18%
QTD vs 2019	1%	0%	-6%	2%	18%
MTD vs 2019	1%	0%	-6%	1%	18%
Previous week vs 2019	0%	2%	-7%	3%	18%
Latest week vs 2019	1%	2%	-7%	4%	18%
Latest day vs 2019	1%	3%	-6%	4%	18%

Source: BofA Global Research, Flightradar24

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Exhibit 3: Average weekly engine thrust vs 2019 across engine OEMs

Engine thrust across all engine OEMs is now >90% vs 2019



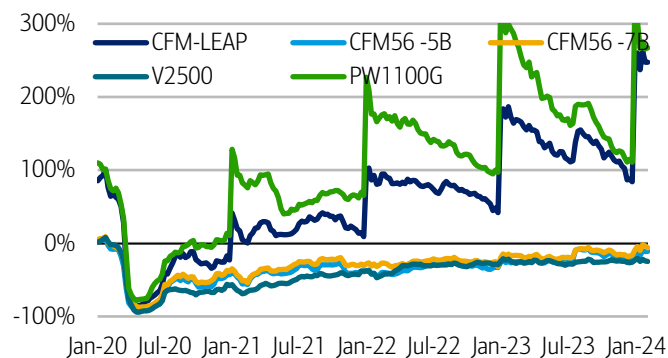
Source: BofA Global Research, Flightradar24

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Engine Categories – N/body, W/body, Freight dominated

Exhibit 4: Narrowbody engine thrust vs 2019

PW1100G and LEAP are largely ahead vs FY19

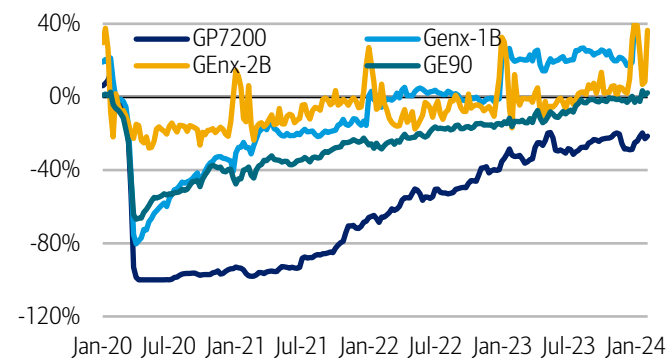


Source: BofA Global Research, Flightradar24

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Exhibit 5: Widebody engine thrust vs 2019

Genx-1B and GENX-2B has climbed back to above FY19 levels

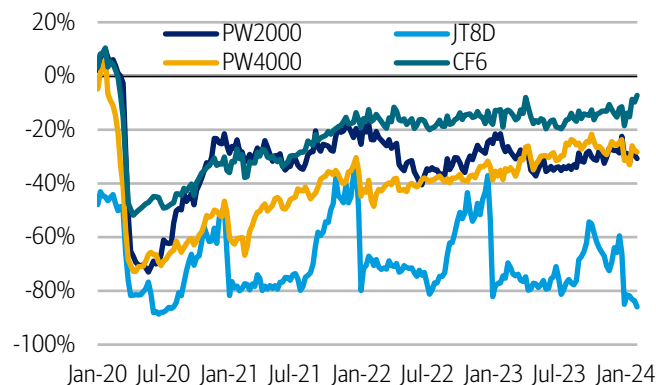


Source: BofA Global Research, Flightradar24

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Exhibit 6: Freight dominated engine thrust vs 2019

JT8D has sharply declined YTD vs FY19

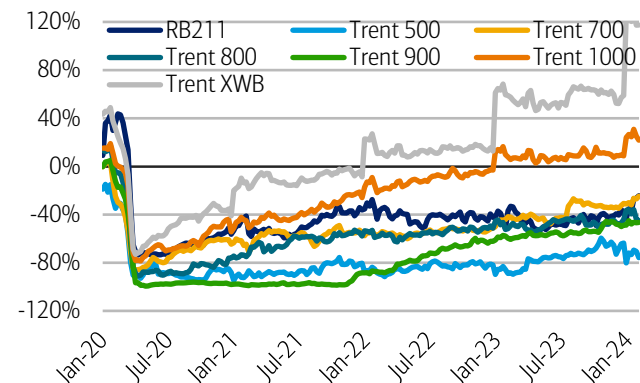


Source: BofA Global Research, Flightradar24

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Exhibit 7: Rolls Royce engine thrust vs 2019

RR is still lagging peers, with only the Trent XWB and the Trent 1000 above FY19 levels



Source: BofA Global Research, Flightradar24

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Exhibit 8: Engine thrust vs 2019 across engine categories

Widebody and Freight engines have increased in 4Q23 vs 3Q23

	Narrowbody	Widebody (all)	Widebody (excl. RR)	Freighter
1Q20 vs 2019	-5%	-6%	-7%	-5%
2Q20 vs 2019	-85%	-65%	-60%	-55%
3Q20 vs 2019	-51%	-56%	-51%	-51%
4Q20 vs 2019	-49%	-46%	-41%	-38%
1Q21 vs 2019	-42%	-43%	-39%	-38%
2Q21 vs 2019	-35%	-38%	-35%	-35%
3Q21 vs 2019	-25%	-35%	-32%	-30%
4Q21 vs 2019	-26%	-28%	-24%	-23%
1Q22 vs 2019	-26%	-25%	-23%	-23%
2Q22 vs 2019	-20%	-23%	-20%	-24%
3Q22 vs 2019	-16%	-20%	-18%	-25%
4Q22 vs 2019	-19%	-19%	-16%	-21%
1Q23 vs 2019	-8%	-10%	-11%	-21%
2Q23 vs 2019	-10%	-10%	-10%	-22%
3Q23 vs 2019	-2%	-5%	-6%	-21%
4Q23 vs 2019	-5%	-3%	-4%	-18%
YTD vs 2019	4%	5%	0%	-19%
QTD vs 2019	4%	5%	0%	-19%

Exhibit 8: Engine thrust vs 2019 across engine categories

Widebody and Freighter engines have increased in 4Q23 vs 3Q23

	Narrowbody	Widebody (all)	Widebody (excl. RR)	Freighter
MTD vs 2019	3%	5%	0%	-19%
Previous week vs 2019	5%	5%	1%	-17%
Latest week vs 2019	4%	7%	2%	-16%
Latest day vs 2019	5%	7%	2%	-17%

Source: BofA Global Research, Flightradar24

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Exhibit 9: Engine thrust vs 2019 across engine families (Narrowbody)

Narrowbody engines have declined in 4Q23 vs 3Q23

	CFM56 -5B	CFM56 -7B	CFM-LEAP	V2500	PW1100G	JT8D	Narrowbody
1Q20 vs 2019	-11%	-7%	59%	-8%	70%	-49%	-5%
2Q20 vs 2019	-88%	-83%	-77%	-89%	-66%	-83%	-85%
3Q20 vs 2019	-52%	-49%	-23%	-66%	-11%	-82%	-51%
4Q20 vs 2019	-53%	-48%	-26%	-65%	1%	-60%	-49%
1Q21 vs 2019	-46%	-43%	19%	-63%	93%	-78%	-42%
2Q21 vs 2019	-40%	-34%	17%	-55%	62%	-78%	-35%
3Q21 vs 2019	-31%	-25%	34%	-45%	60%	-71%	-25%
4Q21 vs 2019	-36%	-26%	25%	-42%	68%	-45%	-26%
1Q22 vs 2019	-41%	-29%	90%	-41%	182%	-71%	-26%
2Q22 vs 2019	-34%	-26%	84%	-30%	160%	-72%	-20%
3Q22 vs 2019	-27%	-22%	76%	-30%	133%	-73%	-16%
4Q22 vs 2019	-32%	-26%	60%	-28%	107%	-50%	-19%
1Q23 vs 2019	-25%	-17%	169%	-25%	277%	-75%	-8%
2Q23 vs 2019	-24%	-19%	135%	-26%	197%	-77%	-10%
3Q23 vs 2019	-13%	-11%	137%	-26%	179%	-74%	-2%
4Q23 vs 2019	-18%	-14%	110%	-25%	130%	-65%	-5%

YTD vs 2019	-13%	-7%	250%	-24%	287%	-83%	4%
QTD vs 2019	-13%	-7%	250%	-24%	287%	-83%	4%
MTD vs 2019	-14%	-8%	247%	-24%	290%	-83%	3%
Previous week vs 2019	-11%	-4%	247%	-24%	266%	-84%	5%
Latest week vs 2019	-11%	-6%	247%	-25%	267%	-86%	4%
Latest day vs 2019	-9%	-6%	254%	-25%	274%	-85%	5%

Source: BofA Global Research, Flightradar24

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Exhibit 10: Engine thrust vs 2019 across engine families (Widebody)

Most Widebody engines have improved in 4Q23 vs 3Q23

	GP7200	PW2000	PW4000	CF6	GE90	Genx-1B	GEnx-2B	RB211	Trent 500	Trent 700	Trent 800	Trent 900	Trent 1000	Trent 7000	Trent XWB	Widebody (all)
1Q20 vs 2019	-6%	1%	-16%	-1%	-10%	1%	0%	23%	-35%	-24%	-7%	-15%	0%	1051%	22%	-6%
2Q20 vs 2019	-100%	-69%	-69%	-48%	-59%	-68%	-21%	-72%	-88%	-81%	-88%	-98%	-71%	-23%	-63%	-65%
3Q20 vs 2019	-98%	-53%	-65%	-45%	-50%	-48%	-17%	-67%	-91%	-71%	-87%	-97%	-66%	-48%	-46%	-56%
4Q20 vs 2019	-96%	-31%	-54%	-35%	-40%	-36%	-18%	-59%	-88%	-63%	-81%	-97%	-52%	-44%	-36%	-46%
1Q21 vs 2019	-96%	-28%	-59%	-32%	-41%	-24%	-7%	-51%	-91%	-62%	-70%	-98%	-46%	527%	-13%	-43%
2Q21 vs 2019	-94%	-30%	-48%	-31%	-35%	-19%	-12%	-56%	-89%	-55%	-65%	-98%	-43%	206%	-12%	-38%
3Q21 vs 2019	-87%	-30%	-42%	-26%	-32%	-19%	-5%	-47%	-86%	-59%	-60%	-98%	-36%	73%	-9%	-35%
4Q21 vs 2019	-74%	-22%	-36%	-18%	-25%	-14%	-2%	-38%	-80%	-54%	-56%	-95%	-26%	24%	-4%	-28%
1Q22 vs 2019	-64%	-22%	-43%	-16%	-26%	-1%	-1%	-36%	-88%	-56%	-56%	-88%	-16%	1443%	16%	-25%
2Q22 vs 2019	-54%	-34%	-40%	-16%	-21%	3%	-10%	-44%	-85%	-57%	-58%	-78%	-13%	626%	12%	-23%
3Q22 vs 2019	-51%	-35%	-38%	-18%	-17%	1%	-6%	-41%	-82%	-53%	-54%	-69%	-7%	216%	14%	-20%
4Q22 vs 2019	-42%	-30%	-36%	-15%	-15%	-1%	-5%	-43%	-82%	-53%	-52%	-63%	-5%	105%	15%	-19%
1Q23 vs 2019	-33%	-26%	-35%	-14%	-13%	22%	6%	-41%	-87%	-44%	-49%	-59%	10%	2620%	59%	-10%
2Q23 vs 2019	-26%	-33%	-30%	-16%	-10%	20%	-4%	-49%	-77%	-43%	-50%	-56%	7%	949%	53%	-10%
3Q23 vs 2019	-27%	-33%	-26%	-16%	-4%	24%	2%	-45%	-73%	-33%	-45%	-55%	9%	376%	61%	-5%
4Q23 vs 2019	-24%	-29%	-26%	-14%	-1%	21%	5%	-42%	-66%	-33%	-47%	-49%	10%	197%	60%	-3%

YTD vs 2019	-22%	-29%	-30%	-12%	0%	45%	28%	-34%	-74%	-29%	-40%	-47%	26%	6044%	125%	5%
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Exhibit 10: Engine thrust vs 2019 across engine families (Widebody)

Most Widebody engines have improved in 4Q23 vs 3Q23

	GP7200	PW2000	PW4000	CF6	GE90	Genx-1B	GEnx-2B	RB211	Trent 500	Trent 700	Trent 800	Trent 900	Trent 1000	Trent 7000	Trent XWB	Widebody (all)
QTD vs 2019	-22%	-29%	-30%	-12%	0%	45%	28%	-34%	-74%	-29%	-40%	-47%	26%	6044%	125%	5%
MTD vs 2019	-23%	-29%	-30%	-12%	0%	45%	35%	-36%	-74%	-30%	-39%	-47%	27%	7924%	126%	5%
Previous week vs 2019	-23%	-29%	-28%	-10%	1%	44%	8%	-27%	-71%	-27%	-44%	-47%	25%	3304%	117%	5%
Latest week vs 2019	-21%	-31%	-28%	-7%	2%	43%	36%	-24%	-76%	-25%	-45%	-47%	22%	3691%	117%	7%
Latest day vs 2019	-21%	-28%	-29%	-9%	2%	42%	31%	-29%	-78%	-25%	-43%	-47%	22%	3722%	117%	7%

Source: BofA Global Research, Flightradar24

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Exhibit 11: P&W engine monthly average flight cycles yoy growth

PW1900G has been the best P&W engine through Jan-24

	GP7200	V2500	PW100	PW1100G	PW1500G	PW1900G	PW2000	PW4000	JT8D	JT9D	Total P&W
Jan-20	9%	2%	19%	94%	67%	379%	4%	3%	-45%	38%	13%
Feb-20	1%	-6%	17%	65%	62%	411%	4%	-15%	-47%	-79%	5%
Mar-20	-39%	-37%	-15%	16%	-6%	228%	-12%	-44%	-58%	-69%	-26%
Apr-20	-99%	-90%	-80%	-72%	-71%	-39%	-52%	-64%	-81%	-69%	-82%
May-20	-100%	-90%	-80%	-67%	-68%	52%	-57%	-61%	-77%	-56%	-81%
Jun-20	-100%	-81%	-67%	-42%	-44%	64%	-51%	-61%	-86%	-92%	-71%
Jul-20	-99%	-63%	-54%	-21%	-19%	120%	-43%	-55%	-85%	-94%	-55%
Aug-20	-96%	-63%	-49%	-13%	-18%	79%	-36%	-51%	-81%	-92%	-52%
Sep-20	-96%	-66%	-50%	-4%	-26%	75%	-26%	-51%	-73%	-52%	-52%
Oct-20	-96%	-63%	-49%	-2%	-41%	80%	-27%	-45%	-69%	0%	-49%
Nov-20	-94%	-63%	-46%	2%	-41%	24%	-22%	-43%	-58%	-83%	-47%
Dec-20	-92%	-59%	-43%	8%	-41%	-2%	-13%	-39%	-48%	-93%	-42%
Vs 2019											
Jan '21 vs '19	-92%	-64%	-34%	95%	-12%	321%	-21%	-54%	-73%	167%	-41%
Feb '21 vs '19	-96%	-66%	-36%	74%	-17%	271%	-21%	-57%	-71%	-39%	-44%
Mar '21 vs '19	-94%	-60%	-35%	85%	-14%	293%	-16%	-46%	-73%	-7%	-38%
Apr '21 vs '19	-91%	-56%	-37%	76%	-11%	240%	-15%	-42%	-77%	42%	-36%
May '21 vs '19	-88%	-57%	-44%	33%	-5%	322%	-21%	-41%	-78%	119%	-42%
Jun'21 vs '19	-89%	-55%	-40%	28%	10%	276%	-17%	-43%	-75%	-40%	-40%
Jul'21 vs '19	-85%	-48%	-40%	44%	29%	471%	-19%	-41%	-77%	-71%	-34%
Aug'21 vs '19	-84%	-49%	-38%	42%	40%	368%	-19%	-49%	-73%	-71%	-33%
Sep'21 vs '19	-83%	-48%	-34%	52%	38%	354%	-11%	-42%	-65%	-87%	-29%
Oct'21 vs '19	-77%	-46%	-31%	52%	37%	337%	-18%	-39%	-59%	-77%	-26%
Nov'21 vs '19	-65%	-45%	-25%	51%	48%	217%	-11%	-44%	-58%	-31%	-23%
Dec'21 vs '19	-63%	-41%	-22%	61%	46%	140%	-12%	-36%	-55%	-63%	-19%
Jan'22 vs '19	-61%	-43%	-13%	171%	136%	824%	-15%	-46%	-77%	-29%	-16%
Feb'22 vs '19	-59%	-45%	-16%	157%	120%	836%	-12%	-48%	-76%	-83%	-17%
Mar'22 vs '19	-56%	-41%	-11%	156%	119%	865%	-11%	-47%	-76%	-78%	-14%
Apr'22 vs '19	-51%	-33%	-9%	147%	125%	839%	-22%	-49%	-77%	-56%	-9%
May'22 vs '19	-48%	-30%	-7%	140%	114%	849%	-24%	-50%	-77%	-37%	-7%
Jun'22 vs '19	-54%	-31%	-7%	128%	110%	632%	-18%	-47%	-77%	-79%	-8%
Jul'22 vs '19	-51%	-31%	-6%	120%	104%	770%	-15%	-47%	-80%	-78%	-8%
Aug'22 vs '19	-52%	-31%	-6%	114%	101%	531%	-16%	-45%	-75%	-90%	-7%
Sep'22 vs '19	-48%	-32%	-7%	97%	91%	550%	-13%	-45%	-67%	-65%	-8%
Oct'22 vs '19	-43%	-30%	-9%	87%	88%	515%	-26%	-45%	-64%	-62%	-8%
Nov'22 vs '19	-36%	-28%	-8%	78%	102%	309%	-11%	-43%	-63%	-86%	-6%
Dec'22 vs '19	-38%	-28%	-7%	81%	90%	232%	-14%	-38%	-60%	-96%	-5%
Jan'23 vs '19	-31%	-26%	9%	261%	218%	1340%	-10%	-37%	-80%	-95%	9%
Feb'23 vs '19	-28%	-27%	5%	238%	226%	1411%	-10%	-34%	-76%	-100%	6%
Mar'23 vs '19	-30%	-27%	7%	217%	204%	1477%	-11%	-31%	-78%	-100%	6%
Apr'23 vs '19	-24%	-26%	5%	193%	192%	1182%	-23%	-27%	-80%	-100%	5%
May'23 vs '19	-18%	-26%	7%	170%	179%	1227%	-23%	-27%	-79%	-96%	5%
Jun'23 vs '19	-24%	-28%	5%	152%	175%	1031%	-19%	-29%	-77%	-100%	2%
Jul'23 vs '19	-24%	-27%	4%	149%	157%	1237%	-23%	-28%	-79%	-99%	2%
Aug'23 vs '19	-23%	-26%	4%	149%	159%	922%	-22%	-28%	-77%	-100%	4%
Sep'23 vs '19	-20%	-26%	3%	130%	144%	925%	-16%	-29%	-69%	-94%	4%
Oct'23 vs '19	-19%	-25%	-1%	111%	143%	892%	-22%	-27%	-69%	-51%	2%
Nov'23 vs '19	-17%	-25%	-1%	98%	140%	563%	-14%	-29%	-70%	17%	2%

Exhibit 11: P&W engine monthly average flight cycles yoy growth

PW1900G has been the best P&W engine through Jan-24

	GP7200	V2500	PW100	PW1100G	PW1500G	PW1900G	PW2000	PW4000	JT8D	JT9D	Total P&W
Dec'23 vs '19	-25%	-25%	-4%	91%	137%	421%	-17%	-27%	-63%	15%	0%
Jan'24 vs '19	-18%	-26%	13%	225%	281%	2227%	-22%	-26%	-79%	14%	9%

Source: BofA Global Research, Flightradar24

BofA GLOBAL RESEARCH

Exhibit 12: GE engine monthly average flight cycles yoy growth

Genx-1B exhibited was the most resilient cycle in Jan-24

	CF34	CF6	GE90	Genx-1B	GE90-2B	Total GE
Jan-20	12%	9%	2%	20%	24%	10%
Feb-20	7%	6%	-6%	-4%	-2%	3%
Mar-20	-21%	-13%	-30%	-29%	-3%	-21%
Apr-20	-78%	-36%	-61%	-74%	-12%	-64%
May-20	-79%	-36%	-51%	-64%	-12%	-62%
Jun-20	-73%	-34%	-53%	-59%	-9%	-59%
Jul-20	-56%	-36%	-51%	-49%	-12%	-49%
Aug-20	-51%	-34%	-48%	-42%	-13%	-45%
Sep-20	-49%	-29%	-42%	-37%	-12%	-42%
Oct-20	-45%	-27%	-38%	-31%	-8%	-38%
Nov-20	-43%	-24%	-34%	-21%	-8%	-35%
Dec-20	-39%	-20%	-31%	-19%	-4%	-31%
Vs 2019						
Jan '21 vs '19	-31%	-22%	-36%	-14%	20%	-28%
Feb '21 vs '19	-40%	-24%	-36%	-19%	0%	-33%
Mar '21 vs '19	-34%	-19%	-34%	-5%	-4%	-28%
Apr '21 vs '19	-31%	-17%	-34%	-5%	-5%	-26%
May '21 vs '19	-31%	-23%	-33%	-12%	-3%	-27%
Jun'21 vs '19	-25%	-21%	-33%	-15%	-5%	-25%
Jul'21 vs '19	-19%	-20%	-30%	-10%	-3%	-20%
Aug'21 vs '19	-19%	-19%	-32%	-21%	-4%	-21%
Sep'21 vs '19	-17%	-15%	-28%	-17%	-1%	-18%
Oct'21 vs '19	-19%	-16%	-24%	-10%	3%	-18%
Nov'21 vs '19	-16%	-12%	-22%	-11%	0%	-16%
Dec'21 vs '19	-18%	-8%	-20%	-9%	4%	-15%
Jan'22 vs '19	-16%	-11%	-24%	1%	21%	-14%
Feb'22 vs '19	-18%	-10%	-24%	3%	5%	-15%
Mar'22 vs '19	-17%	-7%	-20%	5%	-8%	-13%
Apr'22 vs '19	-15%	-7%	-22%	-2%	-11%	-13%
May'22 vs '19	-13%	-12%	-18%	0%	-11%	-13%
Jun'22 vs '19	-16%	-10%	-18%	-1%	-6%	-13%
Jul'22 vs '19	-17%	-13%	-17%	0%	-11%	-14%
Aug'22 vs '19	-17%	-11%	-18%	-1%	-9%	-15%
Sep'22 vs '19	-15%	-9%	-17%	-5%	-10%	-13%
Oct'22 vs '19	-18%	-13%	-17%	-6%	-7%	-15%
Nov'22 vs '19	-17%	-10%	-16%	-6%	-11%	-14%
Dec'22 vs '19	-20%	-14%	-15%	-2%	-10%	-16%
Jan'23 vs '19	-4%	-11%	-13%	27%	12%	-5%
Feb'23 vs '19	-2%	-8%	-11%	29%	4%	-2%
Mar'23 vs '19	-4%	-7%	-9%	33%	0%	-2%
Apr'23 vs '19	-5%	-9%	-6%	26%	-5%	-4%
May'23 vs '19	-5%	-13%	-4%	26%	-5%	-4%
Jun'23 vs '19	-9%	-11%	-2%	31%	-1%	-5%
Jul'23 vs '19	-9%	-16%	-2%	29%	-4%	-6%
Aug'23 vs '19	-6%	-13%	-4%	27%	-5%	-5%
Sep'23 vs '19	-4%	-12%	-4%	23%	-4%	-3%
Oct'23 vs '19	-6%	-15%	-2%	25%	-2%	-4%
Nov'23 vs '19	-4%	-12%	-2%	22%	-5%	-3%
Dec'23 vs '19	-7%	-16%	-2%	19%	-3%	-6%
Jan'24 vs '19	6%	-11%	0%	47%	22%	5%

Source: BofA Global Research, Flightradar24

BofA GLOBAL RESEARCH

Exhibit 12: GE engine monthly average flight cycles yoy growth

Genx-1B exhibited was the most resilient cycle in Jan-24

Exhibit 13: Rolls-Royce engine monthly average flight cycles yoy growth

Rolls-Royce's newest commercial platforms (Trent 1000, Trent 7000 and Trent XWB) have outperformed the broader portfolio in Jan-24

	RB211	Trent 500	Trent 700	Trent 800	Trent 900	Trent 1000	Trent 7000	Trent XWB	Total Rolls-Royce commercial
Jan-20	37%	-20%	5%	15%	2%	25%	2622%	48%	19%
Feb-20	50%	-35%	-34%	0%	-14%	9%	1043%	20%	-8%
Mar-20	5%	-64%	-58%	-44%	-51%	-24%	423%	-23%	-39%
Apr-20	-60%	-87%	-83%	-89%	-97%	-72%	-14%	-68%	-77%
May-20	-61%	-75%	-76%	-86%	-97%	-64%	-33%	-56%	-71%
Jun-20	-62%	-86%	-77%	-88%	-98%	-65%	-48%	-52%	-71%
Jul-20	-56%	-85%	-68%	-89%	-97%	-61%	-55%	-42%	-64%
Aug-20	-52%	-88%	-61%	-90%	-97%	-59%	-53%	-40%	-60%
Sep-20	-53%	-90%	-57%	-85%	-96%	-58%	-47%	-37%	-57%
Oct-20	-46%	-89%	-50%	-85%	-96%	-52%	-34%	-32%	-51%
Nov-20	-41%	-79%	-52%	-82%	-97%	-42%	-33%	-26%	-48%
Dec-20	-36%	-82%	-54%	-75%	-97%	-34%	-31%	-25%	-47%
Vs 2019									
Jan '21 vs '19	-28%	-89%	-55%	-75%	-98%	-30%	1581%	-6%	-44%
Feb '21 vs '19	-33%	-86%	-64%	-72%	-98%	-36%	621%	-14%	-51%
Mar '21 vs '19	-32%	-86%	-51%	-67%	-98%	-33%	312%	-7%	-42%
Apr '21 vs '19	-34%	-82%	-46%	-68%	-97%	-31%	308%	-2%	-38%
May '21 vs '19	-42%	-79%	-47%	-65%	-97%	-35%	203%	-7%	-41%
Jun '21 vs '19	-40%	-84%	-51%	-61%	-98%	-34%	129%	-11%	-43%
Jul '21 vs '19	-37%	-83%	-47%	-60%	-96%	-28%	113%	-7%	-38%
Aug '21 vs '19	-35%	-81%	-62%	-64%	-97%	-27%	76%	-14%	-46%
Sep '21 vs '19	-28%	-76%	-51%	-68%	-98%	-26%	50%	-7%	-39%
Oct '21 vs '19	-21%	-70%	-46%	-63%	-98%	-22%	37%	-5%	-35%
Nov '21 vs '19	-13%	-67%	-56%	-56%	-93%	-17%	29%	-5%	-37%
Dec '21 vs '19	-10%	-72%	-53%	-54%	-88%	-13%	27%	-3%	-34%
Jan '22 vs '19	0%	-82%	-53%	-60%	-87%	3%	3259%	28%	-28%
Feb '22 vs '19	-12%	-82%	-54%	-62%	-87%	-6%	1297%	12%	-34%
Mar '22 vs '19	-15%	-81%	-57%	-65%	-83%	0%	948%	15%	-32%
Apr '22 vs '19	-18%	-77%	-61%	-72%	-79%	-3%	796%	18%	-35%
May '22 vs '19	-27%	-75%	-60%	-68%	-76%	-1%	541%	19%	-34%
Jun '22 vs '19	-29%	-78%	-56%	-67%	-72%	-1%	408%	19%	-32%
Jul '22 vs '19	-25%	-73%	-51%	-65%	-68%	3%	284%	18%	-29%
Aug '22 vs '19	-26%	-74%	-51%	-66%	-67%	1%	181%	21%	-29%
Sep '22 vs '19	-23%	-77%	-53%	-66%	-66%	-1%	143%	19%	-29%
Oct '22 vs '19	-24%	-72%	-55%	-66%	-65%	-3%	106%	18%	-31%
Nov '22 vs '19	-22%	-66%	-56%	-64%	-63%	4%	86%	17%	-29%
Dec '22 vs '19	-22%	-73%	-54%	-59%	-62%	5%	84%	17%	-28%
Jan '23 vs '19	-18%	-80%	-38%	-58%	-60%	32%	5327%	77%	-8%
Feb '23 vs '19	-1%	-84%	-35%	-56%	-59%	30%	2419%	72%	-6%
Mar '23 vs '19	-14%	-81%	-31%	-56%	-57%	31%	1491%	74%	-4%
Apr '23 vs '19	-25%	-71%	-28%	-59%	-57%	24%	1184%	78%	-3%
May '23 vs '19	-29%	-65%	-31%	-57%	-54%	23%	799%	77%	-5%
Jun '23 vs '19	-27%	-64%	-30%	-49%	-49%	24%	616%	78%	-4%
Jul '23 vs '19	-31%	-66%	-27%	-48%	-54%	22%	486%	77%	-3%
Aug '23 vs '19	-28%	-70%	-25%	-49%	-52%	18%	344%	79%	-2%
Sep '23 vs '19	-27%	-70%	-28%	-55%	-51%	18%	283%	76%	-4%
Oct '23 vs '19	-25%	-59%	-28%	-54%	-48%	23%	214%	76%	-2%
Nov '23 vs '19	-21%	-55%	-33%	-48%	-44%	23%	178%	71%	-4%
Dec '23 vs '19	-21%	-61%	-32%	-47%	-46%	20%	165%	69%	-3%
Jan '24 vs '19	-5%	-68%	-25%	-43%	-45%	51%	7477%	144%	15%

Source: BofA Global Research, Flightradar24

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Quarterly flight cycles data tables

Exhibit 14: Major engines quarterly average flight cycles yoy growth

CFM LEAP family has been the best performer in 4Q23

	CFM56 -5B (A320)	CFM56 -7B (737NG)	CFM56 family	CFMLEAP	V2500	GTF family	Rolls-Royce commercial	P&W	GE
1Q20	-16%	-15%	-15%	-7%	-14%	57%	-10%	-3%	-3%
2Q20	-82%	-76%	-78%	-66%	-87%	-59%	-73%	-78%	-62%
3Q20	-53%	-47%	-50%	-18%	-64%	-13%	-60%	-53%	-45%
4Q20	-52%	-43%	-47%	-16%	-62%	-4%	-49%	-46%	-34%
1Q21	-43%	-37%	-39%	-9%	-57%	9%	-40%	-39%	-27%
2Q21	195%	164%	170%	334%	239%	237%	118%	172%	93%
3Q21	29%	31%	31%	124%	45%	71%	48%	45%	47%
4Q21	28%	26%	26%	122%	48%	62%	26%	43%	28%
1Q22	25%	29%	27%	122%	55%	54%	26%	43%	21%
2Q22	19%	13%	15%	97%	56%	73%	12%	52%	17%
3Q22	16%	10%	12%	63%	33%	45%	21%	36%	7%
4Q22	6%	1%	2%	49%	27%	21%	9%	21%	1%
1Q23	26%	19%	21%	61%	29%	32%	37%	27%	13%
2Q23	23%	19%	20%	57%	7%	18%	44%	13%	10%
3Q23	17%	15%	15%	54%	7%	19%	36%	12%	11%
4Q23	22%	20%	20%	49%	5%	14%	37%	9%	12%

Vs 2019

1Q21 vs 1Q19	-51%	-46%	-48%	-16%	-63%	71%	-45%	-41%	-29%
2Q21 vs 2Q19	-47%	-38%	-41%	46%	-56%	39%	-41%	-39%	-26%
3Q21 vs 3Q19	-39%	-31%	-34%	84%	-48%	49%	-41%	-32%	-20%
4Q21 vs 4Q19	-39%	-29%	-33%	88%	-44%	56%	-35%	-23%	-16%
1Q22 vs 1Q19	-39%	-31%	-34%	88%	-43%	163%	-31%	-16%	-14%
2Q22 vs 2Q19	-37%	-29%	-32%	187%	-32%	142%	-33%	-8%	-13%
3Q22 vs 3Q19	-30%	-24%	-27%	199%	-31%	116%	-29%	-8%	-14%
4Q22 vs 4Q19	-35%	-28%	-31%	179%	-29%	89%	-29%	-7%	-15%
1Q23 vs 1Q19	-24%	-17%	-20%	202%	-27%	247%	-6%	7%	-3%
2Q23 vs 2Q19	-22%	-16%	-19%	350%	-27%	184%	-4%	4%	-4%
3Q23 vs 3Q19	-18%	-12%	-15%	360%	-26%	157%	-3%	3%	-5%
4Q23 vs 4Q19	-21%	-14%	-17%	316%	-25%	116%	-3%	1%	-5%

Source: BofA Global Research, Flightradar24

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Exhibit 15: P&W engine quarterly average flight cycles yoy growth

PW1900G has been the best performer P&W engine throughout 4Q23

	GP7200	V2500	PW100	PW1100G	PW1500G	PW1900G	PW2000	PW4000	JT3D	JT8D	JT9D	Total P&W
1Q20	-10%	-14%	7%	56%	39%	337%	-1%	-19%	n.a	-50%	-65%	-3%
2Q20	-100%	-87%	-76%	-60%	-61%	29%	-53%	-62%	n.a	-81%	-80%	-78%
3Q20	-97%	-64%	-51%	-13%	-21%	88%	-35%	-52%	n.a	-80%	-80%	-53%
4Q20	-94%	-62%	-46%	3%	-41%	27%	-20%	-42%	n.a	-59%	-54%	-46%
1Q21	-93%	-57%	-39%	18%	-38%	-9%	-18%	-42%	n.a	-45%	162%	-39%
2Q21	3579%	239%	147%	256%	151%	193%	76%	51%	n.a	26%	439%	172%
3Q21	384%	45%	28%	67%	71%	160%	29%	17%	n.a	40%	22%	45%
4Q21	447%	48%	37%	51%	144%	147%	8%	4%	n.a	3%	-6%	43%
1Q22	562%	55%	33%	41%	162%	138%	8%	11%	n.a	-13%	-74%	43%
2Q22	374%	56%	55%	65%	119%	127%	-4%	-11%	n.a	-3%	-68%	52%
3Q22	217%	33%	50%	44%	47%	43%	2%	-3%	n.a	-9%	-8%	36%
4Q22	92%	27%	24%	18%	34%	36%	-4%	-3%	n.a	-12%	-52%	21%
1Q23	71%	29%	24%	29%	40%	60%	3%	24%	n.a	-8%	-98%	27%
2Q23	59%	7%	14%	14%	30%	44%	0%	41%	n.a	-6%	-98%	13%
3Q23	56%	7%	10%	15%	27%	58%	-7%	32%	n.a	-3%	-89%	12%
4Q23	30%	5%	7%	10%	24%	60%	-1%	25%	n.a	-12%	338%	9%

Vs 2019

1Q21 vs 1Q19	-94%	-63%	-35%	85%	-14%	296%	-19%	-52%	n.a	-73%	-8%	-41%
2Q21 vs 2Q19	-90%	-56%	-40%	44%	-1%	280%	-18%	-42%	n.a	-76%	6%	-39%
3Q21 vs 3Q19	-84%	-48%	-37%	46%	35%	390%	-16%	-44%	n.a	-72%	-76%	-32%
4Q21 vs 4Q19	-68%	-44%	-26%	55%	44%	212%	-14%	-40%	n.a	-58%	-57%	-23%
1Q22 vs 1Q19	-59%	-43%	-13%	161%	125%	842%	-13%	-47%	n.a	-76%	-76%	-16%
2Q22 vs 2Q19	-51%	-32%	-8%	138%	116%	762%	-21%	-49%	n.a	-77%	-66%	-8%
3Q22 vs 3Q19	-50%	-31%	-6%	111%	99%	601%	-15%	-46%	n.a	-75%	-78%	-8%
4Q22 vs 4Q19	-39%	-29%	-8%	82%	93%	326%	-17%	-42%	n.a	-63%	-79%	-7%
1Q23 vs 1Q19	-30%	-27%	7%	238%	215%	1410%	-10%	-34%	n.a	-78%	-100%	7%

Exhibit 15: P&W engine quarterly average flight cycles yoy growth

PW1900G has been the best performer P&W engine throughout 4Q23

	GP7200	V2500	PW100	PW1100G	PW1500G	PW1900G	PW2000	PW4000	JT3D	JT8D	JT9D	Total P&W
2Q23 vs 2Q19	-22%	-27%	6%	170%	182%	1138%	-22%	-27%	n.a	-78%	-99%	4%
3Q23 vs 3Q19	-22%	-26%	4%	143%	153%	1006%	-20%	-28%	n.a	-76%	-98%	3%
4Q23 vs 4Q19	-21%	-25%	-2%	100%	140%	581%	-18%	-28%	n.a	-67%	-10%	1%

Source: BofA Global Research, Flightradar24

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Exhibit 16: GE engine quarterly average flight cycles yoy growth

Genx-1B has been the strongest performer through 4Q23

	CF34	CF6	GE90	Genx-1B	Genx-2B	Total GE
1Q20	-1%	1%	-11%	-5%	5%	-3%
2Q20	-76%	-35%	-55%	-66%	-11%	-62%
3Q20	-52%	-33%	-47%	-43%	-12%	-45%
4Q20	-42%	-24%	-34%	-24%	-7%	-34%
1Q21	-34%	-22%	-27%	-8%	-1%	-27%
2Q21	201%	23%	49%	160%	8%	93%
3Q21	69%	23%	32%	47%	11%	47%
4Q21	43%	15%	18%	18%	10%	28%
1Q22	28%	15%	19%	18%	0%	21%
2Q22	21%	14%	21%	11%	-6%	17%
3Q22	3%	8%	18%	16%	-7%	7%
4Q22	0%	0%	7%	6%	-12%	1%
1Q23	16%	1%	15%	26%	0%	13%
2Q23	9%	-1%	19%	29%	7%	10%
3Q23	11%	-3%	17%	29%	6%	11%
4Q23	15%	-2%	17%	28%	7%	12%

Vs 2019

1Q21 vs 1Q19	-35%	-21%	-35%	-13%	4%	-29%
2Q21 vs 2Q19	-29%	-21%	-33%	-11%	-4%	-26%
3Q21 vs 3Q19	-18%	-18%	-30%	-16%	-3%	-20%
4Q21 vs 4Q19	-18%	-12%	-22%	-10%	3%	-16%
1Q22 vs 1Q19	-17%	-9%	-23%	3%	5%	-14%
2Q22 vs 2Q19	-15%	-10%	-19%	-1%	-10%	-13%
3Q22 vs 3Q19	-16%	-11%	-17%	-2%	-10%	-14%
4Q22 vs 4Q19	-18%	-12%	-16%	-5%	-9%	-15%
1Q23 vs 1Q19	-3%	-9%	-11%	29%	5%	-3%
2Q23 vs 2Q19	-7%	-11%	-4%	27%	-4%	-4%
3Q23 vs 3Q19	-7%	-14%	-3%	27%	-4%	-5%
4Q23 vs 4Q19	-6%	-14%	-2%	22%	-3%	-5%

Source: BofA Global Research, Flightradar24

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Exhibit 17: Rolls-Royce engine quarterly average flight cycles yoy growth

Rolls-Royce's newest commercial platforms (Trent 1000, Trent 7000 and Trent XWB) have outperformed the broader portfolio as of 4Q23

	RB211	Trent 500	Trent 700	Trent 800	Trent 900	Trent 1000	Trent 7000	Trent XWB	Total Rolls-Royce commercial
1Q20	28%	-40%	-29%	-10%	-21%	3%	957%	14%	-10%
2Q20	-61%	-83%	-79%	-88%	-97%	-67%	-36%	-58%	-73%
3Q20	-54%	-88%	-62%	-88%	-97%	-60%	-52%	-40%	-60%
4Q20	-41%	-84%	-52%	-81%	-97%	-43%	-33%	-27%	-49%
1Q21	-46%	-78%	-39%	-68%	-97%	-35%	-33%	-20%	-40%
2Q21	57%	5%	143%	195%	-13%	101%	352%	124%	118%
3Q21	44%	62%	24%	196%	-17%	81%	262%	50%	48%
4Q21	45%	84%	1%	120%	106%	44%	95%	32%	26%
1Q22	32%	43%	4%	31%	531%	48%	115%	30%	26%
2Q22	22%	29%	-21%	-12%	856%	47%	118%	27%	12%
3Q22	13%	28%	2%	-5%	1041%	39%	67%	32%	21%
4Q22	-9%	-3%	-7%	-12%	439%	24%	46%	23%	9%
1Q23	-3%	-1%	44%	16%	192%	32%	63%	47%	37%
2Q23	-2%	43%	72%	45%	90%	26%	41%	50%	44%
3Q23	-5%	23%	52%	43%	44%	18%	56%	48%	36%
4Q23	0%	41%	54%	35%	47%	19%	49%	47%	37%

Exhibit 17: Rolls-Royce engine quarterly average flight cycles yoy growth

Rolls-Royce's newest commercial platforms (Trent 1000, Trent 7000 and Trent XWB) have outperformed the broader portfolio as of 4Q23

	RB211	Trent 500	Trent 700	Trent 800	Trent 900	Trent 1000	Trent 7000	Trent XWB	Total Rolls-Royce commercial
Vs 2019									
1Q21 vs 1Q19	-31%	-87%	-56%	-71%	-98%	-33%	605%	-9%	-45%
2Q21 vs 2Q19	-39%	-82%	-48%	-65%	-97%	-33%	191%	-7%	-41%
3Q21 vs 3Q19	-34%	-80%	-53%	-64%	-97%	-27%	76%	-9%	-41%
4Q21 vs 4Q19	-15%	-70%	-52%	-58%	-93%	-18%	31%	-4%	-35%
1Q22 vs 1Q19	-9%	-81%	-55%	-62%	-86%	-1%	1417%	19%	-31%
2Q22 vs 2Q19	-26%	-77%	-59%	-69%	-76%	-2%	534%	19%	-33%
3Q22 vs 3Q19	-25%	-74%	-52%	-66%	-67%	1%	194%	20%	-29%
4Q22 vs 4Q19	-23%	-71%	-55%	-63%	-63%	2%	91%	17%	-29%
1Q23 vs 1Q19	-12%	-82%	-35%	-56%	-59%	31%	2375%	74%	-6%
2Q23 vs 2Q19	-27%	-67%	-30%	-55%	-53%	24%	796%	78%	-4%
3Q23 vs 3Q19	-29%	-69%	-27%	-51%	-52%	19%	358%	77%	-3%
4Q23 vs 4Q19	-23%	-59%	-31%	-50%	-46%	22%	184%	72%	-3%

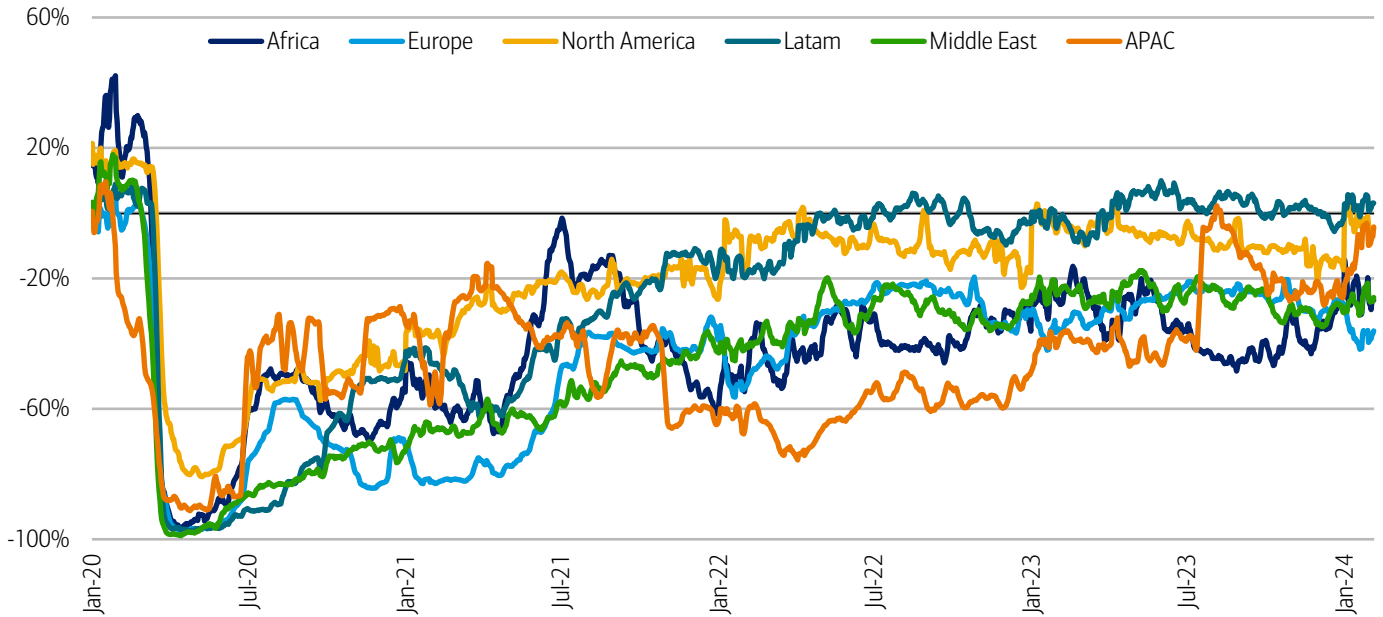
Source: BofA Global Research, Flightradar24

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Engine flight hours – regionally

Exhibit 18: CFM56-5B regional Engine Flight Hours 7 day avg. vs 2019%

CFM56-5B engine flight hours are back at pre COVID levels for Latam

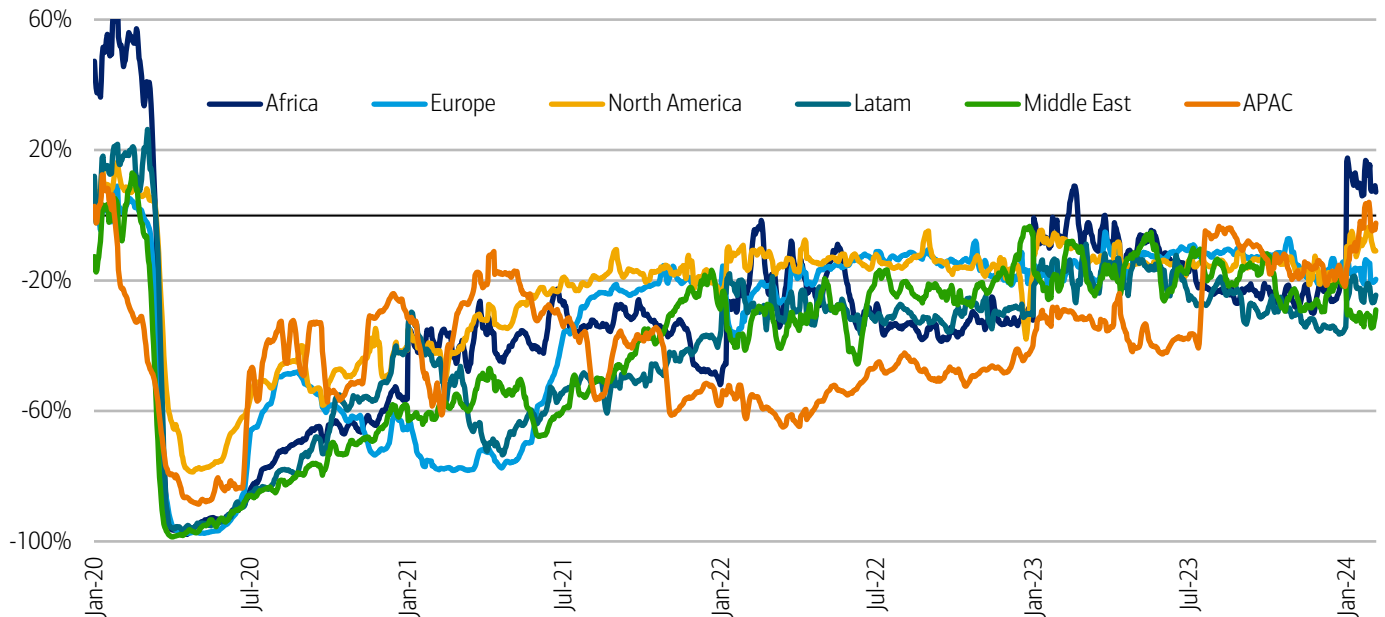


Source: BofA Global Research, Flightradar24

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Exhibit 19: CFM56-7B regional Engine Flight Hours 7 day avg. vs 2019%

CFM56-7B engine flight hours have broadly recovered for many regions

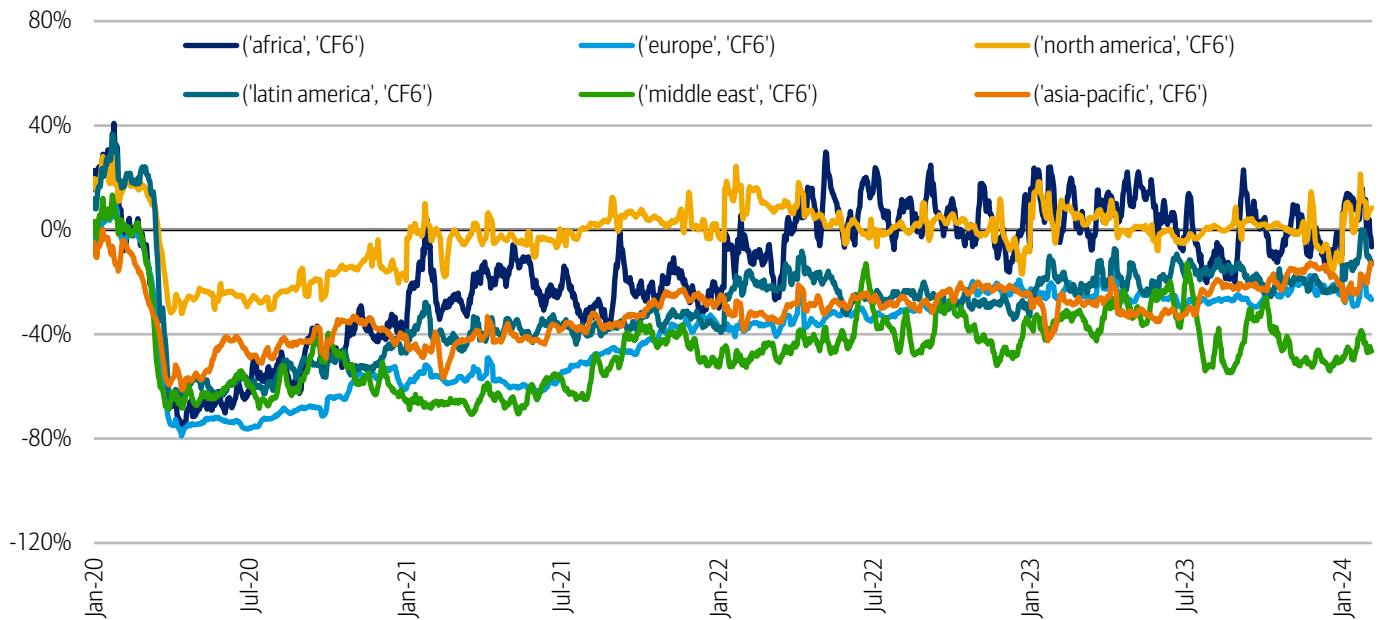


Source: BofA Global Research, Flightradar24

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Exhibit 20: CF6 regional Engine Flight Hours 7 day avg. vs 2019%

CF6 engine flight hours are back at pre COVID levels for North America



Source: BofA Global Research, Flightradar24

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Investment rating	Total return expectation (within 12-month period of date of initial rating)	Ratings dispersion guidelines for coverage cluster ^{R1}
Buy	≥ 10%	≤ 70%
Neutral	≥ 0%	≤ 30%
Underperform	N/A	≥ 20%

^{R1} Ratings dispersions may vary from time to time where BofA Global Research believes it better reflects the investment prospects of stocks in a Coverage Cluster.

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