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Global Theme Machine

January Insights: A Decade of Data

CITI'S TAKE

We launched the Theme Machine here at Citi Research back in 2013, in the throes of the European Sovereign Crisis. Time flies - **we now find ourselves closing in on a full Decade of Thematic Data**. Regular readers will know that using the prism of the Citi Global Theme Machine we analyse the dynamic attractiveness of 90 global Thematics across 5,500 listed companies and seek to make connections to our broader Research. If interested in the full dataset, just let us know – we'd be very happy to discuss in more detail.

Top Themes — What stands out? Energy and Transition themes continue to rank attractively as 2023 opens up, with the top half of the top quintile all being Resource or Energy/Environment related. **ESG/Sustainability investors may be interested to note that this quintile includes themes such as Biofuels, Smart Grids, Wind Energy, Clean Water**. We draw your attention to the following for more on these topics: [Citi GPS: ENERGY TRANSITION - Mixed Momentum on the Path to Net Zero](#). For fresh ideas on investable Disruptive Innovations, read [here](#).

Bottom Themes? — The least attractive quintile still sees Technology and Healthcare related Themes dominate, with Space Race, **Novel Biothreats**, and **Contactless Economy rooted to the foot of our table**, the latter two reflecting the fast-receding pandemic focus from Investors (see: [China Macro / Consumer Sector Views: Consumption-Led Recovery / Top Stock Picks](#)). For more on the fundamental opportunities in Space, [WATCH: Aerospace & Defense: Space: An Investor's Guide to the Galaxy](#).

Performance — In 2023 the Theme Machine enters its 10th calendar year since inception. So, *how was performance through all the tumult and turmoil last year?* **The Theme Machine 2022's Most Attractive theme quintile ended up outperforming MSCI World by 460bps** over the full year, in contrast to the expectations from some that Thematic Investing is "little more than an oversized play on Tech & mere Price Momentum". **The Most Attractive thematic quintile furthermore outperformed the Least Attractive quintile by 940bps**. Over the past 10 years, the **Most Attractive Themes Portfolio** generated an annualised return of 10.69% vs. 8.56% for MSCI World so its annualised (compounded) excess return vs the market is ~2%. When measured against the **Least Attractive Themes Portfolio**, the annualized excess return is ~6.5%. The model does not make any intra-year adjustments to the equal weighted six-Style Factor model.

What's Shifting? — The last 3 months saw Biodiversity, Education, and Global Tourism perform best (all up +20-25% vs MSCI World +10%). Citi Research is positive on all 3 Themes. SaaS, Green Mobility, and Biotech performed weakest (+5%). Find the latest on [Biodiversity](#) and Green Mobility: [Citi GPS: STATE OF GLOBAL ELECTRIC VEHICLE ADOPTION: A Trip Around the World](#)

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Global Theme Machine Insights

Figure 1. Top & Bottom Ranked Themes by Overall Scores – we have included themes' ESG mapping, together with another set of rankings which excludes price momentum in response to questions as to how much our top themes are influenced by momentum. The below shows most themes remain at the top after excluding price momentum.

Portfolio	Theme	E/S/G/NR*	Overall	Overall excluding Price Momentum	Valuation	Growth	Price Momentum	Quality	Low Risk	Earnings Momentum
MSCI World			19 (13)	25	80 (81)	51 (48)	17 (25)	2 (2)	17 (23)	52 (24)
TOP RANKED THEMES										
Scarce Resources	Resources	E	1 (14)	2	12 (9)	20 (25)	3 (6)	19 (18)	67 (69)	1 (80)
Mining Capex	Resources	E	1 (16)	1	10 (5)	14 (21)	4 (2)	10 (11)	82 (83)	2 (90)
Biofuels	Energy/Environment	E	3 (4)	3	8 (13)	7 (3)	13 (8)	18 (31)	87 (90)	18 (13)
Hydro Energy	Energy/Environment	E	4 (16)	5	9 (10)	82 (71)	7 (7)	8 (16)	45 (60)	10 (48)
Fossil Fuels	Energy/Environment	S	5 (2)	9	18 (17)	8 (5)	5 (1)	24 (30)	89 (89)	27 (2)
Smart Grids	Energy/Environment	E	6 (5)	7	22 (25)	85 (77)	14 (12)	4 (8)	32 (24)	20 (18)
Wind Energy	Energy/Environment	E	7 (7)	16	37 (29)	71 (60)	2 (3)	11 (13)	52 (55)	9 (8)
Agriculture Demand	Resources	E	8 (1)	6	17 (21)	30 (24)	40 (9)	13 (4)	23 (25)	72 (11)
Frontiers	Miscellaneous	S	9 (3)	19	49 (16)	52 (63)	19 (23)	16 (5)	35 (32)	31 (12)
Top Brands	Consumption	NR	10 (51)	18	75 (74)	29 (47)	22 (51)	34 (38)	28 (29)	15 (45)
EM Consumer	Consumption	S	11 (26)	14	51 (51)	26 (29)	26 (31)	29 (47)	34 (45)	38 (35)
Energy Storage	Energy/Environment	E	12 (6)	23	40 (45)	35 (20)	8 (5)	22 (22)	59 (70)	41 (4)
Clean Water	Resources	E	13 (46)	15	41 (41)	63 (69)	29 (33)	20 (27)	38 (44)	17 (65)
Belt & Road	Trade/Globalisation/Construction	S	14 (22)	12	1 (1)	38 (36)	34 (21)	5 (7)	86 (73)	47 (86)
Family Run Business	Miscellaneous	G	16 (12)	21	57 (50)	10 (23)	25 (22)	38 (43)	40 (48)	42 (15)
BOTTOM RANKED THEMES										
Clean Tech	Environment	E	77 (67)	87	56 (59)	40 (37)	38 (20)	63 (74)	81 (84)	63 (47)
Video Gaming	Information Technology	NR	77 (74)	68	67 (68)	37 (57)	83 (82)	71 (49)	5 (2)	78 (87)
Aging Demographics Spend	Consumption	S	79 (87)	81	52 (53)	75 (78)	58 (62)	59 (62)	44 (56)	56 (67)
Mobile Network Transition (eg 5G)	Information Technology	S	81 (38)	72	33 (27)	88 (89)	79 (57)	49 (28)	14 (8)	82 (57)
Virtual Reality	Information Technology	S	81 (61)	68	36 (32)	57 (66)	87 (68)	65 (50)	29 (14)	71 (77)
DNA/Genetics	Healthcare	S	81 (87)	87	90 (90)	68 (85)	42 (76)	90 (90)	15 (10)	40 (27)
Value Healthcare Spend	Healthcare	S	83 (66)	85	85 (83)	58 (61)	48 (46)	79 (67)	9 (9)	68 (52)
Green Mobility	Industrial Trends/Environment	E	84 (38)	80	50 (58)	19 (6)	63 (37)	72 (75)	69 (65)	75 (25)
Generics & Biosimilars	Healthcare	S	85 (83)	79	81 (80)	77 (81)	66 (81)	60 (39)	1 (1)	65 (82)
Home of the Future (NEW)	Environment	S	86 (77)	84	7 (8)	86 (87)	64 (74)	44 (42)	64 (51)	90 (91)
Biotech	Healthcare	S	87 (86)	86	91 (91)	87 (84)	56 (67)	91 (91)	13 (19)	19 (22)
Aging Demographic Healthcare Spend	Healthcare	S	88 (91)	90	86 (85)	80 (83)	52 (69)	84 (85)	6 (7)	57 (68)
Contactless Economy	Information Technology	S	89 (89)	81	64 (69)	13 (12)	88 (86)	88 (87)	55 (49)	66 (79)
Novel Biothreats	Healthcare	E/S	90 (77)	89	73 (70)	62 (52)	74 (88)	43 (19)	43 (35)	91 (89)
Space Race	Miscellaneous	S	91 (31)	91	77 (78)	42 (14)	45 (45)	89 (89)	47 (26)	88 (1)

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Source: Citi Research

Figure 2. Stocks with High Exposures to Multiple Top/Bottom 15 Themes

SEDOL	Stock Name	# of Themes	Exposure to Top 15 Themes	Market	Market Capitalisation	Currency	Current Price (6 Jan '23)	Ratings
B058ZV4	COCA COLA ICECEK	4	Top Brands,Frontiers,Family Run Business,EM Consumer	TURKEY	2,508	TRY	189.10	Buy
B03MNV4	ANADOLU EFES BIRACILIK	4	Top Brands,Frontiers,Family Run Business,EM Consumer	TURKEY	1,789	TRY	56.70	Buy
B288C92	IBERDROLA	3	Wind Energy,Smart Grids,Hydro Energy	SPAIN	74,661	EUR	10.87	Neutral
2945422	WEG ON	3	Wind Energy,Smart Grids,Energy Storage	BRAZIL	30,634	BRL	37.55	Buy
BMXC0N9	FLUENCE ENERGY A	3	Wind Energy,Smart Grids,Energy Storage	UNITED STATES	2,298	USD	19.83	Buy
6889106	TAIWAN SEMICON.MNFG.	3	Top Brands,Frontiers,Clean Water	TAIWAN	412,811	TWD	484.50	Buy
5253973	HERMES INTL	3	Top Brands,Family Run Business,EM Consumer	FRANCE	184,443	EUR	1622.50	Neutral
BYYHL23	ANHEUSER-BUSCH INBEV	3	Top Brands,Family Run Business,EM Consumer	BELGIUM	105,673	EUR	56.50	Buy
BCRWZ18	RICHEMONT N	3	Top Brands,Family Run Business,EM Consumer	SWITZERLAND	77,699	CHF	137.60	Buy
5505072	KERING	3	Top Brands,Family Run Business,EM Consumer	FRANCE	71,781	EUR	537.50	Buy

SEDOL	Stock Name	# of Themes	Exposure to Bottom 15 Themes	Market	Market Capitalisation	Currency	Current Price (6 Jan '23)	Ratings
6771720	SAMSUNG ELECTRONICS	6	Virtual Reality,Value Healthcare Spend,Mobile Network Transition (eg	SOUTH KOREA	289,807	KRW	78900.00	Buy
B4X4D29	FLEURY ON	5	Value Healthcare Spend,Generics & Biosimilars,DNA/Genetics,Aging	BRAZIL	1,153	BRL	17.68	Neutral
6520739	LG ELECTRONICS	4	Virtual Reality,Mobile Network Transition (eg 5G),Home of the Future	SOUTH KOREA	12,448	KRW	130500.00	Buy
B01VZ99	LG DISPLAY	4	Virtual Reality,Home of the Future (NEW),Green Mobility,Contactless	SOUTH KOREA	3,747	KRW	24350.00	Buy
7110388	ROCHE HOLDING	4	Value Healthcare Spend,DNA/Genetics,Biotech,Aging Demographic	SWITZERLAND	221,405	CHF	375.55	Buy
2719951	EXACT SCIS.	4	Value Healthcare Spend,DNA/Genetics,Aging Demographics Spend,Aging	UNITED STATES	10,677	USD	79.38	Neutral
B7FQV64	RAIA DROGASIL ON	4	Value Healthcare Spend,Generics & Biosimilars,Aging Demographics	BRAZIL	7,584	BRL	21.49	Neutral
B2QY968	HYPERMARCAS ON	4	Value Healthcare Spend,Generics & Biosimilars,Aging Demographics	BRAZIL	5,291	BRL	26.71	Buy
BYYH7G9	SHOP APOTHEKE EUROPE	4	Value Healthcare Spend,Contactless Economy,Aging Demographics	GERMANY	1,151	EUR	104.20	Buy
BMW5LZ8	OCOCLO DO BRA.SERI.	4	Value Healthcare Spend,DNA/Genetics,Aging Demographics Spend,Aging	BRAZIL	597	BRL	9.82	Buy

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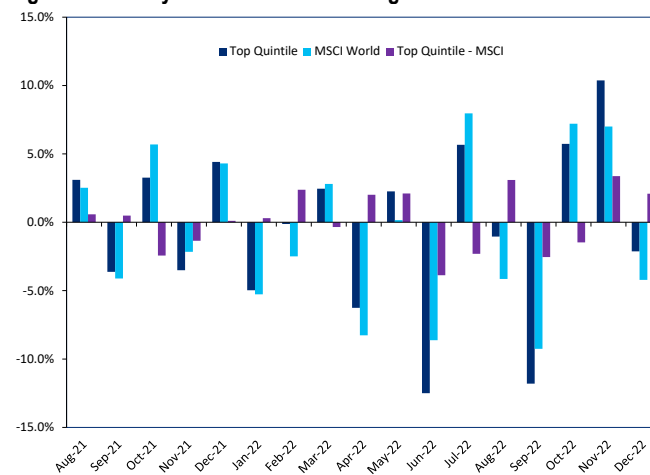
Figure 3. Top/Bottom Quintile Theme Performance vs MSCI World



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Source: Citi Research

Figure 4. Monthly Performance Since August 2021



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Source: Citi Research

Figure 5. Top Performing Themes in December (green denotes the top performing theme for the corresponding period)

Portfolio	Theme	E/S/G/NR*	Last Month Return	Last 3M Return	YTD Return	Last 12M Return	Last 3Y Return	SD of Last Month Ret vs 12M
MSCI World			-4.21%	9.9%	-17.7%	-17.7%	17.3%	-0.44
Global Tourism	Miscellaneous	S	2.14%	21.9%	-6.5%	-6.5%	-2.9%	0.39
Risky Business	Trade/Globalisation/Construction	S	1.84%	21.2%	-8.4%	-8.4%	3.0%	0.36
Education	Miscellaneous	S	1.84%	23.3%	-13.2%	-13.2%	-12.3%	0.37
Medical Tech	Healthcare	S	1.11%	14.6%	-21.9%	-21.9%	7.5%	0.47
Digital Leisure	Information Technology	S	0.82%	17.8%	-29.5%	-29.5%	-6.3%	0.46
Biotech	Healthcare	S	0.78%	5.0%	-27.7%	-27.7%	-6.2%	0.38
Luxury Spend	Consumption	S	0.51%	17.0%	-14.8%	-14.8%	5.4%	0.26
Online/OnDemand Media	Information Technology	NR	0.49%	13.9%	-25.1%	-25.1%	-3.7%	0.42
Pension Shortfalls	Financial	S	0.25%	19.8%	-10.7%	-10.7%	14.9%	0.14
EM Consumer	Consumption	S	0.09%	14.3%	-9.5%	-9.5%	10.3%	0.15

* E: Environmental, S: Social, G: Governance, NR: Not Relevant

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Source: Citi Research

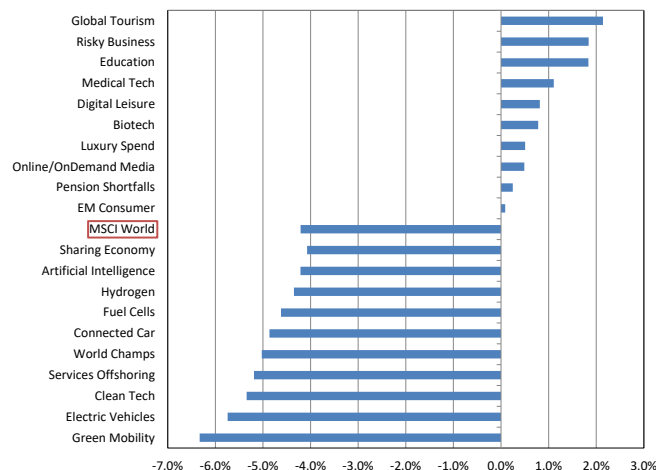
Figure 6. Bottom Performing Themes in December (Red denotes the bottom performing theme for the corresponding period)

Portfolio	Theme	E/S/G/NR*	Last Month Return	Last 3M Return	YTD Return	Last 12M Return	Last 3Y Return	SD of Last Month Ret vs 12M
MSCI World			-4.21%	9.9%	-17.7%	-17.7%	17.3%	-0.44
Green Mobility	Industrial Trends/Environment	E	-6.33%	5.3%	-21.1%	-21.1%	22.8%	-0.65
Electric Vehicles	Industrial Trends/Environment	E	-5.74%	6.9%	-17.8%	-17.8%	32.1%	-0.63
Clean Tech	Environment	E	-5.34%	8.4%	-14.7%	-14.7%	26.1%	-0.55
Services Offshoring	Trade/Globalisation/Construction	S	-5.19%	6.0%	-26.2%	-26.2%	41.4%	-0.43
World Champs	Miscellaneous	NR	-5.03%	13.0%	-9.7%	-9.7%	25.4%	-0.68
Connected Car	Industrial Trends	E	-4.86%	9.5%	-25.4%	-25.4%	19.5%	-0.37
Fuel Cells	Energy/Environment	E	-4.62%	12.3%	-14.4%	-14.4%	7.3%	-0.47
Hydrogen	Environment	E	-4.35%	13.7%	-11.5%	-11.5%	56.2%	-0.45
Artificial Intelligence	Information Technology	S	-4.21%	7.3%	-32.3%	-32.3%	11.9%	-0.18
Sharing Economy	Information Technology	S	-4.07%	10.7%	-29.4%	-29.4%	21.0%	-0.20

* E: Environmental, S: Social, G: Governance, NR: Not Relevant

Source: Citi Research

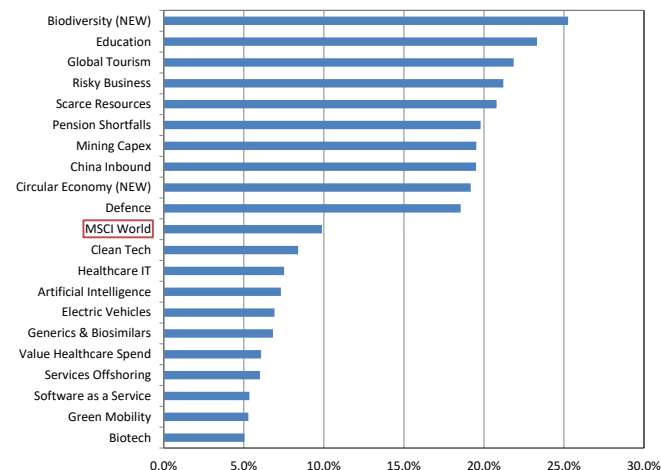
Figure 7. Top 10 & Bottom 10 Themes by Last month's Returns



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Source: Citi Research, MSCI

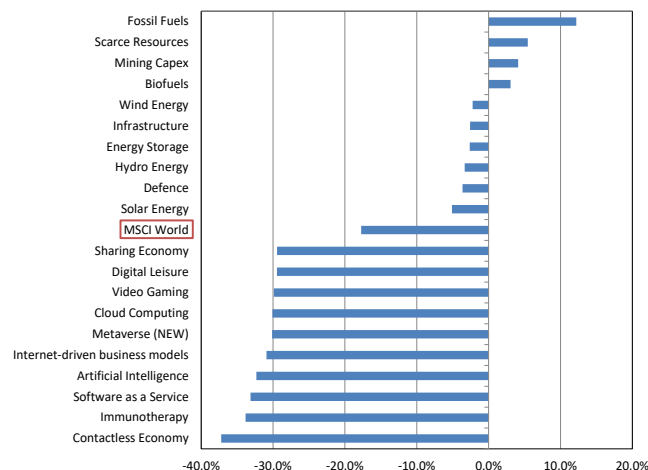
Figure 8. Top 10 & Bottom 10 Themes by Last 3 months' Returns



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Source: Citi Research, MSCI

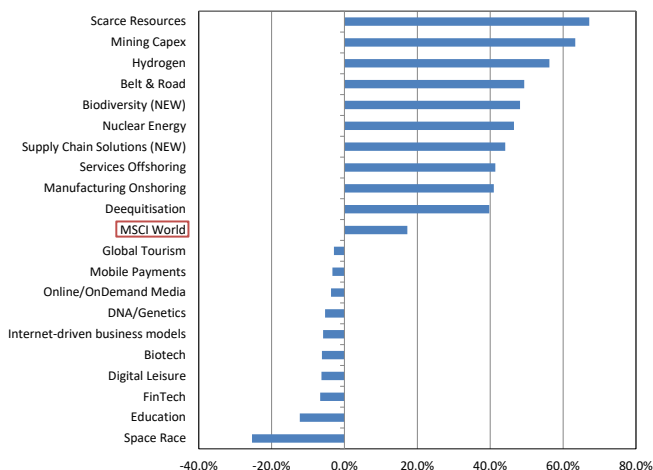
Figure 9. Top 10 & Bottom 10 Themes by Last 12 months' Returns



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Source: Citi Research, MSCI

Figure 10. Top 10 & Bottom 10 Themes by Last 3 Years' Returns



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Source: Citi Research, MSCI

Figure 11. Top 10 Most Significant Outperforming Themes Measured by Standard Deviation (green denotes the top performer)

Portfolio	Theme	E/S/G/NR*	SD of Last Month Ret vs 12M	Last Month Return	Last 3M Return	YTD Return	Last 12M Return	Last 3Y Return
MSCI World			-0.44	-4.21%	9.9%	-17.7%	-17.7%	17.3%
Medical Tech	Healthcare	S	0.47	1.11%	14.6%	-21.9%	-21.9%	7.5%
Digital Leisure	Information Technology	S	0.46	0.82%	17.8%	-29.5%	-29.5%	-6.3%
Online/OnDemand Media	Information Technology	NR	0.42	0.49%	13.9%	-25.1%	-25.1%	-3.7%
Global Tourism	Miscellaneous	S	0.39	2.14%	21.9%	-6.5%	-6.5%	-2.9%
Biotech	Healthcare	S	0.38	0.78%	5.0%	-27.7%	-27.7%	-6.2%
Education	Miscellaneous	S	0.37	1.84%	23.3%	-13.2%	-13.2%	-12.3%
Risky Business	Trade/Globalisation/Construction	S	0.36	1.84%	21.2%	-8.4%	-8.4%	3.0%
Aging Demographic Healthcare Spend	Healthcare	S	0.27	-0.20%	10.5%	-19.4%	-19.4%	4.7%
Luxury Spend	Consumption	S	0.26	0.51%	17.0%	-14.8%	-14.8%	5.4%
Software as a Service	Information Technology	S	0.25	-1.65%	5.3%	-33.1%	-33.1%	3.8%

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Source: Citi Research, MSCI

Figure 12. Bottom 10 Significant Underperforming Themes Measured by Standard Deviation (red denotes the bottom performer)

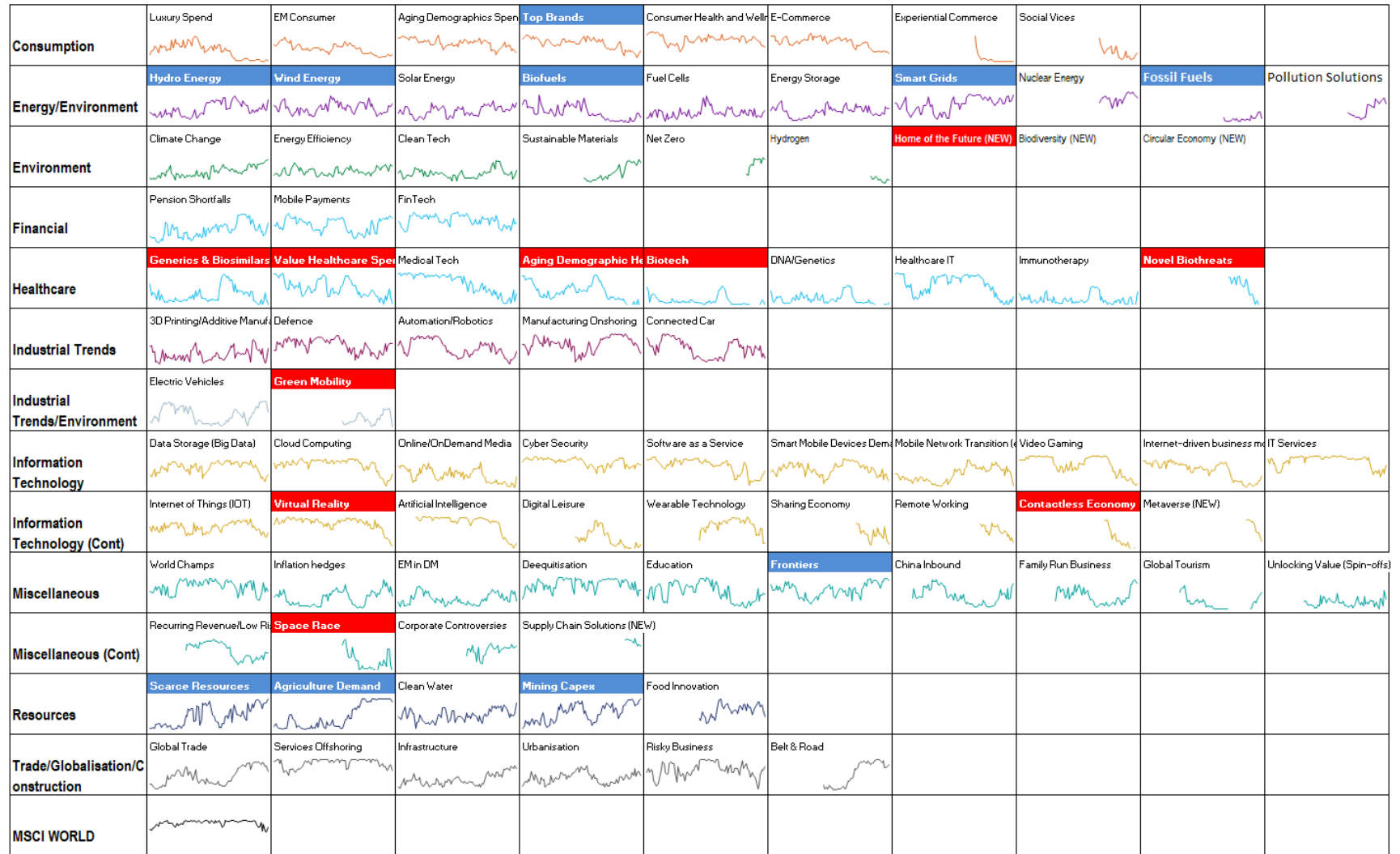
Portfolio	Theme	E/S/G/NR*	SD of Last Month Ret vs 12M	Last Month Return	Last 3M Return	YTD Return	Last 12M Return	Last 3Y Return
MSCI World			-0.44	-4.21%	9.9%	-17.7%	-17.7%	17.3%
World Champs	Miscellaneous	NR	-0.68	-5.03%	13.0%	-9.7%	-9.7%	25.4%
Green Mobility	Industrial Trends/Environment	E	-0.65	-6.33%	5.3%	-21.1%	-21.1%	22.8%
Fossil Fuels	Energy/Environment	S	-0.64	-3.31%	15.4%	12.2%	12.2%	31.1%
Electric Vehicles	Industrial Trends/Environment	E	-0.63	-5.74%	6.9%	-17.8%	-17.8%	32.1%
Energy Storage	Energy/Environment	E	-0.56	-4.01%	11.1%	-2.6%	-2.6%	32.3%
Clean Tech	Environment	E	-0.55	-5.34%	8.4%	-14.7%	-14.7%	26.1%
Biofuels	Energy/Environment	E	-0.49	-3.27%	18.3%	3.0%	3.0%	11.6%
Fuel Cells	Energy/Environment	E	-0.47	-4.62%	12.3%	-14.4%	-14.4%	7.3%
Hydrogen	Environment	E	-0.45	-4.35%	13.7%	-11.5%	-11.5%	56.2%
Services Offshoring	Trade/Globalisation/Construction	S	-0.43	-5.19%	6.0%	-26.2%	-26.2%	41.4%

* E: Environmental, S: Social, G: Governance, NR: Not Relevant

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Source: Citi Research, MSCI

Figure 13. Overall Theme Rankings Since Jan 2016 (blue denotes the top 10 themes and red for the bottom 10 themes this month)



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Source: Citi Research

Top/Bottom 10: Change in Ranking

The following table shows the rank changes in themes over the past three months.

Figure 14. Largest Upward and Downward (in italics) Moves in Rankings When Compared to Previous Quarter in Brackets

Overall	Valuation	Growth	Price Momentum	Quality	Low Risk	Earnings Momentum
MSCI WORLD 19 (13)	MSCI WORLD 80 (81)	MSCI WORLD 51 (48)	MSCI WORLD 17 (25)	MSCI WORLD 2 (2)	MSCI WORLD 17 (23)	MSCI WORLD 52 (24)
China Inbound 16 (60)	Electric Vehicles 31 (47)	Online/OnDemand Medi 36 (64)	Education 43 (83)	Risky Business 50 (80)	Hydro Energy 45 (60)	Mining Capex 2 (30)
Top Brands 10 (51)	Connected Car 19 (35)	FinTech 9 (31)	DNA/Genetics 42 (76)	Pollution Solutions 45 (72)	Software as a Servic 7 (20)	Scarce Resources 1 (80)
Immunotherapy 51 (90)	3D Printing/Additive 13 (26)	Mobile Payments 22 (44)	Immunotherapy 61 (91)	Energy Efficiency 28 (54)	Corporate Controvers 56 (68)	China Inbound 26 (85)
Pension Shortfalls 31 (65)	Metaverse (NEW) 26 (38)	Social Vices 32 (53)	Medical Tech 49 (79)	3D Printing/Additive 26 (48)	Data Storage (Big Da 22 (34)	Internet-driven busi 12 (63)
Clean Water 13 (46)	Remote Working 27 (39)	Video Gaming 37 (57)	Top Brands 22 (51)	EM Consumer 29 (47)	Aging Demographics S 44 (56)	Clean Water 17 (65)
IT Services 24 (53)	Sharing Economy 38 (49)	E-Commerce 18 (38)	Consumer Health and 54 (75)	Experiential Commerc 62 (78)	Energy Storage 59 (70)	Experiential Commerc 25 (72)
Software as a Servic 40 (67)	Green Mobility 50 (58)	Recurring Revenue/Lo 49 (68)	Global Tourism 12 (32)	China Inbound 31 (46)	EM Consumer 34 (45)	Automation/Robotics 28 (75)
Pollution Solutions 57 (83)	Food Innovation 47 (54)	IT Services 46 (65)	World Champs 20 (39)	Social Vices 12 (26)	Risky Business 66 (76)	Healthcare IT 5 (50)
Risky Business 19 (44)	Automation/Robotics 55 (62)	Top Brands 29 (47)	EM in DM 36 (54)	Connected Car 52 (66)	Education 30 (39)	IT Services 11 (53)
Internet-driven busi 55 (79)	Contactless Economy 64 (69)	Immunotherapy 17 (34)	Aging Demographic He 52 (69)	Defence 7 (21)	Net Zero 54 (62)	Pension Shortfalls 24 (66)
...
Inflation hedges 52 (25)	Education 62 (56)	Wearable Technology 53 (39)	Virtual Reality 87 (68)	FinTech 77 (64)	Nuclear Energy 58 (47)	Connected Car 69 (21)
Manufacturing Onshor 54 (27)	EM in DM 46 (40)	Circular Economy (NE 28 (13)	Mobile Payments 65 (43)	EM in DM 42 (29)	Smart Mobile Devices 24 (13)	EM in DM 55 (7)
Biodiversity (NEW) 61 (32)	Mobile Network Trans 33 (27)	Energy Storage 35 (20)	Mobile Network Trans 79 (57)	Virtual Reality 65 (50)	Sharing Economy 48 (36)	Green Mobility 75 (25)
EM in DM 65 (36)	Family Run Business 57 (50)	World Champs 43 (27)	Connected Car 67 (44)	Medical Tech 76 (61)	Home of the Future (64 (51)	Education 67 (17)
Connected Car 69 (34)	Deequitisation 59 (52)	Global Trade 45 (28)	Biodiversity (NEW) 59 (35)	Corporate Controvers 32 (14)	Belt & Road 86 (73)	Sharing Economy 83 (32)
Wearable Technology 73 (34)	Urbanisation 29 (22)	Biodiversity (NEW) 59 (40)	Inflation hedges 41 (17)	Generics & Biosimila 60 (39)	Metaverse (NEW) 25 (11)	Electric Vehicles 61 (10)
Mobile Network Trans 81 (38)	Infrastructure 23 (15)	Metaverse (NEW) 47 (26)	Sharing Economy 90 (64)	Mobile Network Trans 49 (28)	Virtual Reality 29 (14)	Agriculture Demand 72 (11)
Green Mobility 84 (38)	Wind Energy 37 (29)	Connected Car 55 (32)	Green Mobility 63 (37)	Video Gaming 71 (49)	Digital Leisure 62 (42)	Food Innovation 70 (3)
Sharing Economy 75 (28)	Online/OnDemand Medi 54 (46)	Space Race 42 (14)	Cyber Security 71 (42)	Novel Biothreats 43 (19)	Space Race 47 (26)	World Champs 86 (16)
Space Race 91 (31)	Frontiers 49 (16)	Manufacturing Onshor 67 (18)	Agriculture Demand 40 (9)	Wearable Technology 68 (33)	Wearable Technology 41 (16)	Space Race 88 (1)

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Source: Citi Research

Top/Bottom 5: Valuation

Figure 15. Valuation Top/Bottom 5 Theme Rankings (shaded column, previous ranking in parenthesis)

Portfolio	Theme	Overall	Valuation	Growth	Price Momentum	Quality	Low Risk	Earnings Momentum
MSCI World		19 (13)	80 (81)	51 (48)	17 (25)	2 (2)	17 (23)	52 (24)
Belt & Road	Trade/Globalisation/Construction	14 (22)	1 (1)	38 (36)	34 (21)	5 (7)	86 (73)	47 (86)
Pension Shortfalls	Financial	31 (65)	2 (2)	91 (91)	39 (48)	46 (57)	53 (53)	24 (66)
Biodiversity (NEW)	Environment	61 (32)	3 (3)	59 (40)	59 (35)	33 (34)	68 (61)	85 (81)
Risky Business	Trade/Globalisation/Construction	19 (44)	4 (4)	84 (86)	11 (26)	50 (80)	66 (76)	4 (5)
Manufacturing Onshoring	Industrial Trends	54 (27)	5 (7)	67 (18)	60 (63)	21 (24)	63 (58)	80 (76)
***	***	***	***	***	***	***	***	***
World Champs	Miscellaneous	38 (15)	87 (87)	43 (27)	20 (39)	1 (1)	37 (40)	86 (16)
Software as a Service	Information Technology	40 (67)	88 (88)	5 (10)	91 (87)	86 (86)	7 (20)	3 (30)
Immunotherapy	Healthcare	51 (90)	89 (89)	17 (34)	61 (91)	87 (88)	18 (21)	22 (60)
DNA/Genetics	Healthcare	81 (87)	90 (90)	68 (85)	42 (76)	90 (90)	15 (10)	40 (27)
Biotech	Healthcare	87 (86)	91 (91)	87 (84)	56 (67)	91 (91)	13 (19)	19 (22)

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Source: Citi Research

Top/Bottom 5: Growth

Figure 16. Growth Top/Bottom 5 Theme Rankings (shaded column, previous ranking in parenthesis)

Portfolio	Theme	Overall	Valuation	Growth	Price Momentum	Quality	Low Risk	Earnings Momentum
MSCI World		19 (13)	80 (81)	51 (48)	17 (25)	2 (2)	17 (23)	52 (24)
Global Tourism	Miscellaneous	40 (62)	83 (84)	1 (2)	12 (32)	80 (82)	91 (91)	13 (19)
Sharing Economy	Information Technology	75 (28)	38 (49)	2 (1)	90 (64)	67 (65)	48 (36)	83 (32)
Internet-driven business models	Information Technology	55 (79)	78 (76)	3 (8)	86 (89)	85 (83)	33 (37)	12 (63)
Experiential Commerce	Consumption	60 (83)	70 (72)	4 (7)	57 (47)	62 (78)	88 (88)	25 (72)
Software as a Service	Information Technology	40 (67)	88 (88)	5 (10)	91 (87)	86 (86)	7 (20)	3 (30)
***	***	***	***	***	***	***	***	***
Biotech	Healthcare	87 (86)	91 (91)	87 (84)	56 (67)	91 (91)	13 (19)	19 (22)
Mobile Network Transition (eg 5G)	Information Technology	81 (38)	33 (27)	88 (89)	79 (57)	49 (28)	14 (8)	82 (57)
Deequitisation	Miscellaneous	37 (29)	59 (52)	89 (88)	10 (18)	9 (3)	26 (30)	76 (58)
Unlocking Value (Spin-offs)	Miscellaneous	59 (57)	32 (33)	90 (90)	16 (29)	39 (36)	84 (85)	43 (23)
Pension Shortfalls	Financial	31 (65)	2 (2)	91 (91)	39 (48)	46 (57)	53 (53)	24 (66)

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Source: Citi Research

Top/Bottom 5: Price Momentum

Figure 17. Price Momentum Top/Bottom 5 Theme Rankings (shaded column, previous ranking in parenthesis)

Portfolio	Theme	Overall	Valuation	Growth	Price Momentum	Quality	Low Risk	Earnings Momentum
MSCI World		19 (13)	80 (81)	51 (48)	17 (25)	2 (2)	17 (23)	52 (24)
Defence	Industrial Trends	29 (37)	63 (61)	79 (80)	1 (13)	7 (21)	65 (63)	34 (20)
Wind Energy	Energy/Environment	7 (7)	37 (29)	71 (60)	2 (3)	11 (13)	52 (55)	9 (8)
Scarce Resources	Resources	1 (14)	12 (9)	20 (25)	3 (6)	19 (18)	67 (69)	1 (80)
Mining Capex	Resources	1 (16)	10 (5)	14 (21)	4 (2)	10 (11)	82 (83)	2 (90)
Fossil Fuels	Energy/Environment	5 (2)	18 (17)	8 (5)	5 (1)	24 (30)	89 (89)	27 (2)
***	***	***	***	***	***	***	***	***
Virtual Reality	Information Technology	81 (61)	36 (32)	57 (66)	87 (68)	65 (50)	29 (14)	71 (77)
Contactless Economy	Information Technology	89 (89)	64 (69)	13 (12)	88 (86)	88 (87)	55 (49)	66 (79)
Digital Leisure	Information Technology	75 (71)	72 (73)	6 (11)	89 (90)	83 (81)	62 (42)	16 (38)
Sharing Economy	Information Technology	75 (28)	38 (49)	2 (1)	90 (64)	67 (65)	48 (36)	83 (32)
Software as a Service	Information Technology	40 (67)	88 (88)	5 (10)	91 (87)	86 (86)	7 (20)	3 (30)

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Source: Citi Research

Top/Bottom 5: Quality

Figure 18. Quality Top/Bottom 5 Theme Rankings (shaded column, previous ranking in parenthesis)

Portfolio	Theme	Overall	Valuation	Growth	Price Momentum	Quality	Low Risk	Earnings Momentum
MSCI World		19 (13)	80 (81)	51 (48)	17 (25)	2 (2)	17 (23)	52 (24)
World Champs	Miscellaneous	38 (15)	87 (87)	43 (27)	20 (39)	1 (1)	37 (40)	86 (16)
Nuclear Energy	Energy/Environment	18 (10)	28 (28)	76 (62)	15 (14)	3 (6)	58 (47)	36 (37)
Smart Grids	Energy/Environment	6 (5)	22 (25)	85 (77)	14 (12)	4 (8)	32 (24)	20 (18)
Belt & Road	Trade/Globalisation/Construction	14 (22)	1 (1)	38 (36)	34 (21)	5 (7)	86 (73)	47 (86)
Services Offshoring	Trade/Globalisation/Construction	30 (30)	76 (77)	33 (41)	73 (58)	6 (12)	2 (3)	60 (59)
***	***	***	***	***	***	***	***	***
Immunotherapy	Healthcare	51 (90)	89 (89)	17 (34)	61 (91)	87 (88)	18 (21)	22 (60)
Contactless Economy	Information Technology	89 (89)	64 (69)	13 (12)	88 (86)	88 (87)	55 (49)	66 (79)
Space Race	Miscellaneous	91 (31)	77 (78)	42 (14)	45 (45)	89 (89)	47 (26)	88 (1)
DNA/Genetics	Healthcare	81 (87)	90 (90)	68 (85)	42 (76)	90 (90)	15 (10)	40 (27)
Biotech	Healthcare	87 (86)	91 (91)	87 (84)	56 (67)	91 (91)	13 (19)	19 (22)

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Source: Citi Research

Top/Bottom 5: Low Risk

Figure 19. Low Risk Top/Bottom 5 Theme Rankings (shaded column, previous ranking in parenthesis)

Portfolio	Theme	Overall	Valuation	Growth	Price Momentum	Quality	Low Risk	Earnings Momentum
MSCI World		19 (13)	80 (81)	51 (48)	17 (25)	2 (2)	17 (23)	52 (24)
Generics & Biosimilars	Healthcare	85 (83)	81 (80)	77 (81)	66 (81)	60 (39)	1 (1)	65 (82)
Services Offshoring	Trade/Globalisation/Construction	30 (30)	76 (77)	33 (41)	73 (58)	6 (12)	2 (3)	60 (59)
IT Services	Information Technology	24 (53)	68 (67)	46 (65)	68 (71)	41 (32)	3 (4)	11 (53)
Food Innovation	Resources	48 (22)	47 (54)	83 (82)	46 (34)	40 (45)	4 (6)	70 (3)
Video Gaming	Information Technology	77 (74)	67 (68)	37 (57)	83 (82)	71 (49)	5 (2)	78 (87)
***	***	***	***	***	***	***	***	***
Biofuels	Energy/Environment	3 (4)	8 (13)	7 (3)	13 (8)	18 (31)	87 (90)	18 (13)
Experiential Commerce	Consumption	60 (83)	70 (72)	4 (7)	57 (47)	62 (78)	88 (88)	25 (72)
Fossil Fuels	Energy/Environment	5 (2)	18 (17)	8 (5)	5 (1)	24 (30)	89 (89)	27 (2)
3D Printing/Additive Manufacturing	Industrial Trends	42 (64)	13 (26)	24 (15)	51 (66)	26 (48)	90 (86)	77 (74)
Global Tourism	Miscellaneous	40 (62)	83 (84)	1 (2)	12 (32)	80 (82)	91 (91)	13 (19)

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Source: Citi Research

Top/Bottom 5: Earnings Momentum

Figure 20. Earnings Momentum Top/Bottom 5 Theme Rankings (shaded column, previous ranking in parenthesis)

Portfolio	Theme	Overall	Valuation	Growth	Price Momentum	Quality	Low Risk	Earnings Momentum
MSCI World		19 (13)	80 (81)	51 (48)	17 (25)	2 (2)	17 (23)	52 (24)
Scarce Resources	Resources	1 (14)	12 (9)	20 (25)	3 (6)	19 (18)	67 (69)	1 (80)
Mining Capex	Resources	1 (16)	10 (5)	14 (21)	4 (2)	10 (11)	82 (83)	2 (90)
Software as a Service	Information Technology	40 (67)	88 (88)	5 (10)	91 (87)	86 (86)	7 (20)	3 (30)
Risky Business	Trade/Globalisation/Construction	19 (44)	4 (4)	84 (86)	11 (26)	50 (80)	66 (76)	4 (5)
Healthcare IT	Healthcare	64 (85)	82 (82)	54 (56)	72 (78)	82 (84)	16 (17)	5 (50)
***	***	***	***	***	***	***	***	***
Metaverse (NEW)	Information Technology	67 (44)	26 (38)	47 (26)	82 (73)	51 (41)	25 (11)	87 (88)
Space Race	Miscellaneous	91 (31)	77 (78)	42 (14)	45 (45)	89 (89)	47 (26)	88 (1)
Sustainable Materials	Environment	72 (53)	24 (23)	50 (46)	50 (50)	35 (23)	76 (77)	89 (73)
Home of the Future (NEW)	Environment	86 (77)	7 (8)	86 (87)	64 (74)	44 (42)	64 (51)	90 (91)
Novel Biothreats	Healthcare	90 (77)	73 (70)	62 (52)	74 (88)	43 (19)	43 (35)	91 (89)

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Source: Citi Research

Which Themes are Crowded in Europe?

Given the rise in flows into thematic ETFs and thematic instruments in general over the past few years, to what extent are our themes crowded? Citi Quant's Crowding Model assigns a composite score to stocks belonging to regional benchmarks based on five individual crowding measures (see our Quant Crowding report [here](#) for a more detailed description). Whilst there's no consensus on whether crowding is a risk or tailwind, it's informative to know where the crowds are investing.

Figure 21. Top 10 EU Theme Portfolios by largest Decrease/Increase in Crowding

Portfolio	Theme	Dec-22	Nov-22	Change
Mobile Network Transition (eg 5G)	Information Technology	0.12%	0.13%	-8.42%
Video Gaming	Information Technology	0.20%	0.22%	-8.40%
Remote Working	Information Technology	0.10%	0.11%	-7.67%
Online/OnDemand Media	Information Technology	0.16%	0.17%	-7.19%
Food Innovation	Resources	0.31%	0.34%	-6.92%
Metaverse (NEW)	Information Technology	0.12%	0.13%	-6.74%
Education	Miscellaneous	0.48%	0.51%	-6.23%
Digital Leisure	Information Technology	0.16%	0.18%	-5.93%
Medical Tech	Healthcare	0.17%	0.18%	-4.58%
Frontiers	Miscellaneous	0.23%	0.24%	-4.34%
***	***	***	***	***
Biodiversity (NEW)	Environment	0.50%	0.48%	2.57%
Circular Economy (NEW)	Environment	0.30%	0.29%	2.74%
Corporate Controversies	Miscellaneous	0.13%	0.13%	3.35%
Inflation hedges	Miscellaneous	0.13%	0.13%	3.61%
Risky Business	Trade/Globalisation/Construction	0.90%	0.86%	5.58%
Social Vices	Consumption	0.51%	0.47%	7.08%
Defence	Industrial Trends	0.56%	0.52%	7.42%
Novel Biothreats	Healthcare	0.72%	0.67%	8.03%
Mining Capex	Resources	0.27%	0.25%	8.52%
Scarce Resources	Resources	0.27%	0.24%	11.26%

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Source: Citi Research

In Europe, Mobile Network Transitions, Video Gaming and Remote Working have seen the largest decrease in their crowding score. On the other end of the spectrum, Scarce Resources (continued from last month), Mining Capex and Novel Biothreats rank the highest in terms of the largest increase in their crowding score though the latter theme is the 7th most crowded theme based on the most recent data. Currently the most crowded themes include World Champs, Deequitisation and Risky Business; the three least crowded themes include Biotech, E-Commerce and EM Consumer all three of which were also the three least crowded themes last month in Europe.

Which Themes are Crowded in USA?

The themes containing US stocks only which saw the largest decrease in their Crowding score include Circular Economy, Biofuels and Services Offshoring – despite this last theme being the 8th most crowded Theme in the US.

Figure 22. Top 10 US Theme Portfolios by largest Decrease/Increase in Crowding

Portfolio	Theme	Dec-22	Nov-22	Change
Circular Economy (NEW)	Environment	0.30%	0.37%	-17.65%
Biofuels	Energy/Environment	0.21%	0.24%	-13.07%
Services Offshoring	Trade/Globalisation/Construction	0.60%	0.65%	-7.63%
Mobile Payments	Financial	0.09%	0.10%	-7.57%
Video Gaming	Information Technology	0.24%	0.26%	-7.45%
Metaverse (NEW)	Information Technology	0.14%	0.15%	-5.97%
FinTech	Financial	0.09%	0.09%	-5.61%
Agriculture Demand	Resources	0.39%	0.41%	-5.30%
Green Mobility	Industrial Trends/Environment	0.09%	0.10%	-5.20%
Home of the Future (NEW)	Environment	0.14%	0.15%	-5.03%
***	***	***	***	***
Scarce Resources	Resources	0.23%	0.22%	5.78%
Fuel Cells	Energy/Environment	0.29%	0.28%	5.93%
Risky Business	Trade/Globalisation/Construction	0.43%	0.40%	6.06%
Mining Capex	Resources	0.18%	0.17%	6.56%
Value Healthcare Spend	Healthcare	0.28%	0.27%	6.57%
Hydro Energy	Energy/Environment	0.24%	0.22%	6.82%
Defence	Industrial Trends	0.46%	0.43%	7.06%
Wearable Technology	Information Technology	0.30%	0.27%	9.83%
Belt & Road	Trade/Globalisation/Construction	0.29%	0.26%	14.18%
Biodiversity (NEW)	Environment	1.12%	0.84%	32.53%

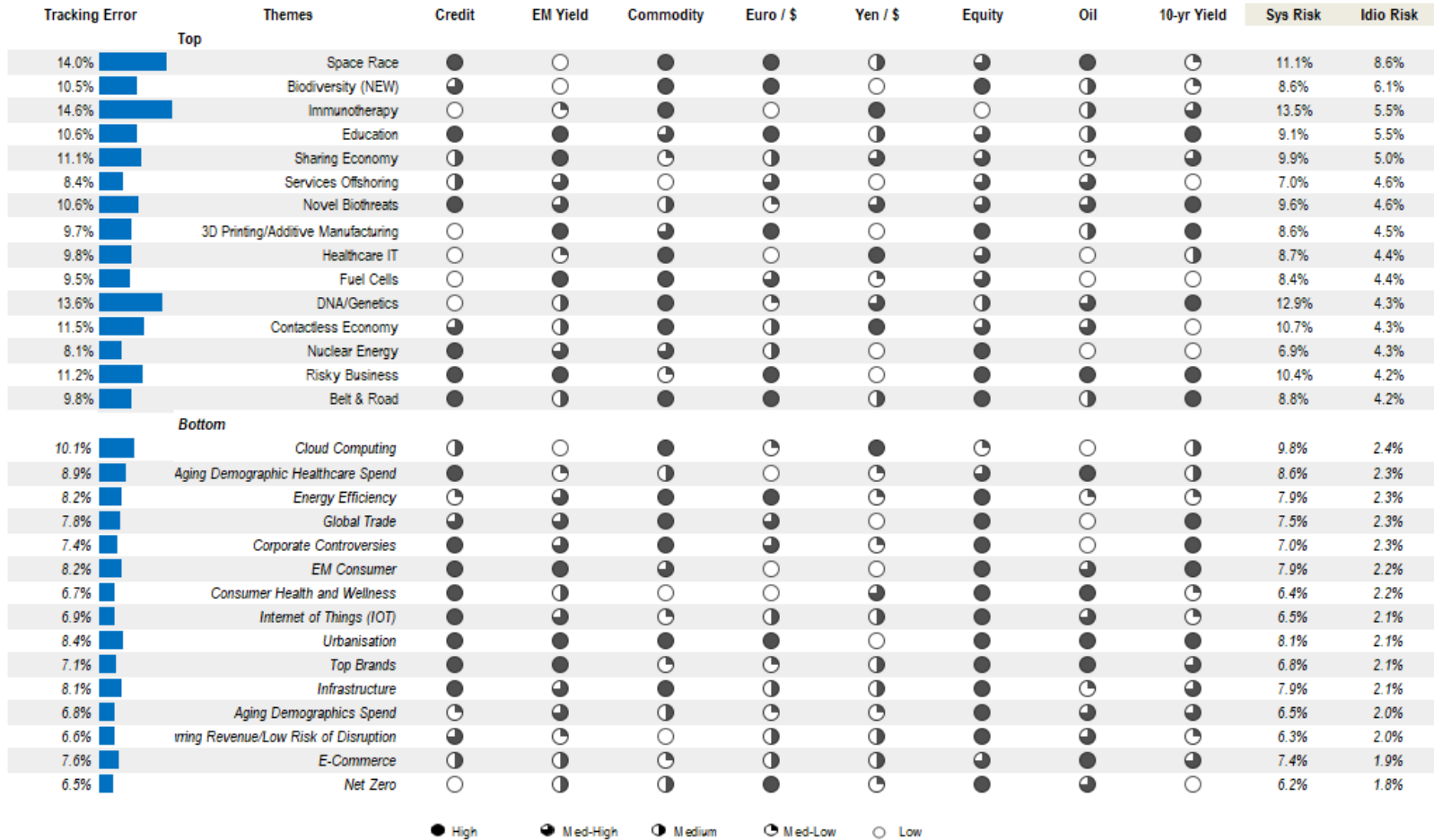
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Source: Citi Research

Themes which became more crowded by the greatest magnitude over the past month include Biodiversity, Belt & Road and Wearable Technology. The top three most crowded themes in the US include Space Race, World Champs and Deequitisation, as last month. Two of the least crowded themes were also the least crowded last month is the US: EM Consumer and E-Commerce. Aging Demographics Spend is also the least crowded theme

Idiosyncratic Risk and Relative Macro Exposures

Figure 23. Using Citi's Global Macro Risk Model (GRAM), We Show Top 15 and Bottom 15 Themes Based on Idiosyncratic Risk Relative to MSCI World Benchmark. Also Shown Are Themes Relative Exposures to GRAM Macro Factors Compared to the 84 Themes. For e.g. Immunotherapy Is in the Top Quintile of all Themes Based on Credit but Bottom Quintile for EUR/USD



Source: Citi Research

Update to our SDG Mapping

Incorporating The New Themes Introduced in 2022

Figure 24. UN SDG Theme Mapping (continues next page)

	1 NO POVERTY	2 ZERO HUNGER	3 GOOD HEALTH AND WELL-BEING	4 QUALITY EDUCATION	5 GENDER EQUALITY	6 CLEAN WATER AND SANITATION	7 AFFORDABLE AND CLEAN ENERGY	8 DECENT WORK AND ECONOMIC GROWTH	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	10 REDUCED INEQUALITIES	11 SUSTAINABLE CITIES AND COMMUNITIES	12 RESPONSIBLE CONSUMPTION AND PRODUCTION	13 CLIMATE ACTION	14 LIFE BELOW WATER	15 LIFE ON LAND	16 PEACE, JUSTICE AND STRONG INSTITUTIONS	17 PARTNERSHIPS FOR THE GOALS
3D Printing/Additive Manufacturing	L		L					L	L		M	H	L				L
Aging Demographic Healthcare Spend											L						
Aging Demographics Spend											L						
Agriculture Demand						- M	- L	- L	- L	- L	- L	- L			- L		
Artificial Intelligence	L	L	M	L		L	L	M	M	M	M	M	L			L	
Automation/Robotics	- L	M	L	L		M	M	L	M	- L	H	M	L		M		
Belt & Road	L	L	L	L	L	L	L	M	M	L	L				- L		
Biodiversity (NEW)	M	H	M			H			M	M	M	H	H	H	H	L	L
Biofuels																	
Biotech	L	H	H			L		L	M	L	L						
China Inbound							L	L		L	L						
Circular Economy (NEW)	H	M	L			L		L	H	M	M	H	H	M	M	L	L
Clean Tech	L	L	M			H	H	M	H	L	H	H	H	L	L	L	
Clean Water	H	H	H	L		H	L	M	M	M	H	H	H	H	L	L	
Climate Change	M	M	M			M	M	H	H	L	H	H	H	L	L	L	L
Cloud Computing	L	L	M	L	L	L		L	M		M	M	L				
Connected Car			M				M	L	M		H	L					
Consumer Health and Wellness			H		L			L			L	L					
Contactless Economy (NEW)			M	M					H	M	L						
Corporate Controversies (New)	- M	- L	- L		- H			- M	- L	- M		- L				- H	
Cyber Security																H	
Data Storage (Big Data)	L	L	M	L		L	L	L	M	L	M	L	L	L	L	M	
Dequitsation																	
Defence	- M	- L			- L				M	- L						M	
Digital Leisure				L	L				L						L		
DNA/Genetics			H						M	M							
E-Commerce				L					M	M		L					
Education	H	M	M	H	H			M	M	H	M	H	M			H	H
Electric Vehicles			M				H	M	M			H	H		M		
EM Consumer								M	L								
EM in DM	L	L		L	L		L	M	L	L		L					
Energy Efficiency	L	L	M			L	H	H	H	L	H	H	H			L	
Energy Storage	L	L	L			L	H	L	H	L	H	H	H	L	L	L	L
Experiential Commerce					L			M	M	L	M	H	L	L	L		
Family Run Business								M	L								
FinTech	M	M	L	H	L			M	M	M	M	L				L	L
Food Innovation	H	H	M	L		M	M	M	M	M	M	H	M	L	M		
Fossil Fuels			- H			- M	- H	- L	- M		- M	- H	- H	- H	- H		
Frontiers	L	L	L	L	L		L	M	L	M	M						
Fuel Cells	L	L	L			L	H	L	H	L	H	H	H			L	
Generics & Biosimilars	L	L	H					L	M	L						L	
Global Tourism								M	H		L						
Global Trade	L	M	L	L	L	L	M	H	H	H	M	- L	- L			M	M
Green Mobility			H			H	H	H	H	L	H	H	H	L	M	L	M
Healthcare IT	L		H		M		H	L	M	M	M	M					

Source: Citi Research

Figure 25. UN SDG Theme Mapping Continued

	1 NO POVERTY	2 ZERO HUNGER	3 GOOD HEALTH AND WELL-BEING	4 QUALITY EDUCATION	5 GENDER EQUALITY	6 CLEAN WATER AND SANITATION	7 AFFORDABLE AND CLEAN ENERGY	8 DECENT WORK AND ECONOMIC GROWTH	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	10 REDUCED INEQUALITIES	11 SUSTAINABLE CITIES AND COMMUNITIES	12 RESPONSIBLE CONSUMPTION AND PRODUCTION	13 CLIMATE ACTION	14 LIFE BELOW WATER	15 LIFE ON LAND	16 PEACE, JUSTICE AND STRONG INSTITUTIONS	17 PARTNERSHIPS FOR THE GOALS
Home of the Future (NEW)	H		M			H	H	M	H	H	H	H	H				M
Hydro Energy	L	L	L			- M	H	L	H	L	H	H	H	M		L	
Hydrogen			M			L	H	M			H	H	H	L	H		
Immunotherapy			H						L								
Inflation hedges																	
Infrastructure	H	M	M	M	L	H	H	M	H	H	H				L	M	M
Internet of Things (IOT)	L	L	L	L	L	L	L	M	H	L	M	M	L	L	L	L	
Internet-driven business models			L	L	M			H	M	M	L	L					
IT Services	L	L	L	L		L	L	L	M		L	L	L			L	
Luxury Spend									L								
Manufacturing Onshoring	L							L	L		M	M					
Medical Tech	L		H		L			M	M	L	M	M					
Metaverse (NEW)	L		M	M	M			M	H	M	L	L	L			L	
Mining Capex						- M	- L		L			- L	- L	- L	- L		
Mobile Network Transition (eg 5G)	L	L	L	L				L	H	L	M						
Mobile Payments	M	M	L	H	L			M	M	M	M					L	
Net Zero			H			H	H	L	M		M	H	H	H	H	L	L
Novel Biothreats			H						L	L						L	L
Nuclear Energy						- M	L		L	L	L		L		L		
Online/OnDemand Media				L	L				L	L			L			L	
Pension Shortfalls								L									
Pollution Solutions			H			H	H	L	H	L	H	H	H	H	H	L	L
Recurring Revenue/Low Risk of Disruption	L	L		L	L			L	L	L							
Remote Working									H	L	M	H	M	M	H		
Risky Business					L						L		L	- L	- L		
Scarce Resources	- L	- M				- M	L					- L	- L	- L	- L		
Services Offshoring	L							M	M	M							
Sharing Economy									H	L	M	H	M	M	H		
Smart Grids	L	L	L			L	H	L	H	L	H	H	M	M		L	L
Smart Mobile Devices Demand	L	L		M	L	L		M	M	L						M	
Social Vices			- L														
Software as a Service				M	L			M	M						M		
Solar Energy	L	L	M			L	H	L	H	L	H	H	H			L	
Space Race									M								
Supply Chain Solutions (NEW)	M	L	M	L	L	M		H	M	H	L	H	L	M	M	M	L
Sustainable Materials			L	M		H		M	M		H	H	M	H			
Top Brands		- L				- L					L	L			- M		
Unlocking Value (Spin-offs)								L	L								
Urbanisation	M	M	M	M	L	M	M	M	M	M	H				L	L	L
Value Healthcare Spend	L		H		M			M	M	L							
Video Gaming				L	L			L									
Virtual Reality			L	M					M		L	L	L				
Wearable Technology			M						L								
Wind Energy	L	L	M			L	H	M	H	L	H	H	H		M	L	
World Champs	L			L	L	L	L	M	M	M	L	M	L				

Source: Citi Research

Previously Published Research

Figure 26. Research Reports (since 2009)

Date	Research Theme	Report Link
26-Jul-21	Machine Learning	Searching for Alpha: Practical Considerations in Building Neural Networks for Stock Selection
22-Jul-21	ESG	ESG Insights: Indexed ESG Funds – A Widespread Implementation Choice
22-Jun-21	Factor	Searching for Alpha: Go with the Stock Connect Flow, for a Sharpe of 4
18-Jun-21	Factor	Searching for Alpha: Overlaying Price Mo. and Short Interest to avoid drawdowns and improve returns
15-Jun-21	ESG	ESG Insights: ESG Fundamental Characteristics
13-Apr-21	ESG	ESG Insights: Following the ESG Herd: Has ESG become a Crowded Trade?
29-Mar-21	Machine Learning	Searching for Alpha: Pairs Trading: Applying Machine Learning to Pairs Trading
09-Mar-21	Positioning	Regime Modelling using Futures Positioning: Futures vs. Cash – A Distant but Meaningful Relationship
18-Feb-21	ESG	ESG Insights: The ESG 'Premium': How does ESG compare to other Factors?
01-Feb-21	Event	Searching for Alpha: Asia Earnings Surprise: Predicting Asia Earnings Surprises
14-Jan-21	ESG	ESG Insights: Where Machines do it Better: Inferred ESG Ratings Data
30-Oct-20	Factor	Searching for Alpha: China A Alpha – Smoothing Price Momentum
16-Oct-20	Factor	Under the Microscope: Overlapping Momentum
14-Sep-20	Positioning	Equity Markets Positioning Model: Introducing the EMP
11-Sep-20	Factor	Searching for Alpha: Combining ESG and Risk Premia Investment: A Double Screen Approach
08-Sep-20	Factor	Searching for Alpha: Factoring Short Interest: Measuring and Profiting from Information in Shorts
28-May-20	Machine Learning	Searching for Alpha: Machine Learning - SHAP Value as Factor Selection Criterion
28-Feb-20	Machine Learning	Searching for Alpha: Machine Learning: Leveraging Return Forecasts
21-Feb-20	Factor	Searching for Alpha: China A Alpha – Sector-rel. Value Is Powerful, Choose Sector Mappings Wisely
03-Oct-19	Machine Learning	Searching for Alpha: Machine Learning: Beyond Random Forest for Stock Selection
23-Sep-19	Event	Searching for Alpha: Earnings Surprise: Managing Expectations
05-Mar-19	Machine Learning	Searching for Alpha: Machine Learning: Interpreting Machine Learning Predictions
07-Feb-19	Misc	Searching for Alpha: GAAP vs. Non-GAAP: Which Earnings does the Market Price?
21-Nov-18	Positioning	Searching for Alpha: Style Crowding in Asia: Getting Ahead of the Crowd
17-Sep-18	Event	Searching for Alpha: Earnings Surprise: Using ML to Forecast Earnings Surprises & Returns
13-Sep-18	ESG	Searching for Alpha: The ESG Edge: ESG Investing – A Step Forward
03-Sep-18	Machine Learning	Searching for Alpha: Machine Learning: Interacting Machine Learning and Factors
03-May-18	Positioning	Measuring the Crowded Trade: Introduction to our Crowding Composite for individual stocks
14-Mar-18	Factor	Searching for Alpha: Profiting from Capex: Look To Capex Announcements
07-Sep-17	Rotation	Searching for Alpha: Tactical Style Rotation: Using Risk and Return to Manage Style Exposure
10-Mar-17	Misc	Searching for Alpha: Big Data: Navigating New Alternative Datasets
13-Sep-17	Factor	Searching for Alpha: Betting Against (Accurate) Beta
19-Sep-16	Factor	Searching for Alpha: Competitive Advantage: Survival of the Fittest
09-Sep-16	Factor	Searching for Alpha: Financial Strength Redux
14-Apr-16	Rotation	Searching for Alpha: Dynamic Style Weighting: Risk-Based Equity Style Allocation
04-Mar-16	Smart Beta	Long-Only Pure Style Portfolios: No Shorts Please
18-Feb-16	Factor	Industry Alpha Insights: Banks: One Size Does Not Fit All
21-Sep-15	Factor	Under the Microscope: Stock Momentum Conflation
15-Sep-15	Allocation	Searching for Alpha: Macro Moves Markets: Economic Data, Expectations and Market Pricing
23-Mar-15	Rotation	Searching for Alpha: Style Timing: Style Performance, Trading Volumes and Investor Agreement
13-Mar-15	Misc	World Radar Screen: Refining Our Global Search for Alpha
18-Feb-15	Factor	Searching for Alpha: Networking with Analysts: Modelling Analyst Forecast Dependence
01-Oct-14	Smart Beta	The Rise of Low Risk Investing: Is It Getting Crowded Out There?
27-Mar-14	Factor	Under the Microscope: Five Innovations In Momentum Investing
07-Mar-14	Factor	Searching for Alpha: Timing Price Momentum: When Does Momentum Move?
27-Nov-13	Smart Beta	Equity Risk Premia Investing: A New Methodology for Monitoring Style Performance
23-Jul-13	Allocation	Stock Market Country Selection: Changes to a Well-Established Model
02-Jul-13	Factor	Searching for Alpha: Digging For Dividends: QUARI - Quality with A Reliable Income
24-Jun-13	Misc	Global Theme Machine: An Objective Way of Identifying Attractive Investment Themes
25-Mar-13	Factor	Searching for Alpha: Purifying Analyst Recommendations: Removing Beta to get to the Alpha
06-Nov-12	Factor	Searching for Alpha: Tangible Benefits of Intangibles: Brand, Respect & Intellectual Capital
09-Mar-12	Smart Beta	Low-Risk Portfolio Strategies: Sharpe Ratio Maximisation and Multi-Asset Applications
28-Feb-12	Rotation	Macro Risk and Style Rotation: A Guide Rather than a Prescription
14-Sep-11	Factor	Searching for Alpha: Accruals Volatility - A New Approach to Quality Investing
24-Aug-11	Allocation	Industry Alpha Insights: Four Approaches to Tactical Industry Selection
17-Mar-11	Misc	Industry Alpha Insights: Quantifying Industry-Specific Fundamentals
18-Nov-10	Smart Beta	Low-Risk Equity Portfolios: More than just Minimum Variance
15-Nov-10	Allocation	Under the Microscope: Measuring Systemic Risk - The Absorption Ratio
14-Jun-10	Factor	Under the Microscope: Optionality in Valuation
31-Mar-10	Event	Searching for Alpha: Earnings Surprise: Still Profiting from Surprises
29-Jan-10	Factor	Momentum in Japan: Looking at Price, Trading Values and Earnings
15-Oct-09	Rotation	Searching for Alpha: Style Rotation: Optimising Style Rotation Strategies

Source: Citi Research

Citi Quant Research Team

Figure 27. Citi Quantitative Research Teams

Global Quantitative Research (For Informational Purposes Only)

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Companies Mentioned:

Kering (PRTP.PA; €524.3; 1; 10 Jan 23; 17:30) | Hermes (HRMS.PA; €1606.5; 2; 10 Jan 23; 17:30) | AB-InBev (ABI.BR; €56.34; 1; 10 Jan 23; 17:30) | Samsung Electronics (005930.KS; W60500.0; 1; 11 Jan 23; 15:45) | LG Electronics (066570.KS; W94800.0; 1; 11 Jan 23; 15:45) | Richemont (CFR.S; SFr134.95; 1; 10 Jan 23; 17:30) | Roche Holding AG (ROG.S; SFr292.55; 1; 10 Jan 23; 17:30) | Exact Sciences Corporation (EXAS.O; US\$60.09; 2; 10 Jan 23; 16:00) | Anadolu Efes Biracilik ve Malt Sanayi (AEFES.IS; TL60.45; 1; 10 Jan 23; 18:10) | Coca-Cola Icecek (CCOLA.IS; TL187.7; 1; 10 Jan 23; 18:10) | Iberdrola (IBE.MC; €10.8; 2; 10 Jan 23; 17:30) | WEG (WEGE3.SA; R\$37.55; 1; 10 Jan 23; 18:00) | TSMC (2330.TW; NT\$484.5; 1; 11 Jan 23; 13:30) | LG Display (034220.KS; W13050.0; 1; 11 Jan 23; 15:45) | RD (RADL3.SA; R\$24.01; 2; 10 Jan 23; 18:00) | Hypera SA (HYPE3.SA; R\$43.25; 1; 10 Jan 23; 18:00) | Fleury (FLRY3.SA; R\$15.47; 2; 10 Jan 23; 18:00) | Shop Apotheke Europe (SAEG.DE; €56.92; 1; 10 Jan 23; 17:30) | Oncoclinicas (ONCO3.SA; R\$6.25; 1; 10 Jan 23; 18:00) | Fluence Energy Inc (FLNC.O; US\$19.83; 1H; 10 Jan 23; 16:00)

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Appendix A-1

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Data current as of 31 Dec 2022	12 Month Rating			Catalyst Watch		
	Buy	Hold	Sell	Buy	Hold	Sell
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% of companies in each rating category that are investment banking clients	60%	65%	52%	68%	57%	65%
Citi Research Quantitative World Radar Screen Model Coverage	30%	40%	30%			
% of companies in each rating category that are investment banking clients	38%	32%	29%			
Citi Research Quantitative Latam Radar Screen Model Coverage	20%	60%	20%			
% of companies in each rating category that are investment banking clients	69%	60%	61%			
Citi Research Quantitative Asia Radar Screen Model Coverage	20%	60%	20%			
% of companies in each rating category that are investment banking clients	35%	26%	17%			
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