



GLOBAL X ETFs RESEARCH

The Next Big Theme: May 2023



Authored by:

Mayuranki De
Research Analyst

Date: May 18, 2023
Topic: **Disruptive Technology, Physical Environment, People & Demographics**



Related Posts

New York Auto Show Recap: Electric Vehicle Innovation Prominently on Display

Private Market Perspectives: Road to AI Supremacy Goes Through Venture Land

Chile Lithium Update: Boric's Plans Fall Short of Nationalization

The Consumer Pulse: PropTech Adoption

Internet of Things

Global Semiconductor Wars Take Shape

The National Institute of Standards and Technology (NIST), which is part of the U.S. Department of Commerce, published a paper detailing its plans for a National Semiconductor Technology Center (NSTC).¹ The center is a critical element of the CHIPS and Science Act's research and development (R&D) program. The NSTC aims to enhance U.S. leadership in semiconductor R&D, engineering, and advanced manufacturing. The main objectives include strengthening U.S. competitiveness, making the process from design idea to its commercialization more time and cost efficient, and establishing a semiconductor workforce development ecosystem.² Meanwhile, in China, the government wants to counter growing U.S. sanctions that target advanced chip-making. In 2022, Beijing distributed over 12.1 billion yuan (US\$1.75 billion) in subsidies to 190 domestically listed semiconductor companies.³ The top 10 recipients of the subsidies received 45% of the total payout, equivalent to 5.46 billion yuan.⁴ Semiconductor Manufacturing International Corp (SMIC) was the largest beneficiary, receiving 1.95 billion yuan for the year.⁵

E-commerce

Consumers Shift Online, Retailers Diversify

Major e-commerce players are diversifying their revenue streams. A prime example is Amazon, which uses third-party sellers and subscription-based business segments to generate income.⁶ In addition, Amazon's strides in advertising revenue now make it the third-largest digital advertising company globally, behind Google and Facebook. Last year, Amazon sold almost \$40 billion worth of advertising, which is more than the revenue it generates from Amazon Prime.^{7,8} In the broader retail industry, Bed Bath & Beyond's closure is expected to trigger additional retail store closures. According to one estimate, 50,000 physical stores in the United States could close by 2027, excluding gas and food service stations.⁹ In many cases, the costs of operating retail stores are no longer worth the return, especially in the clothing, accessories, and electronics sectors.¹⁰ Other factors, such as increasing e-commerce penetration, a slowdown in consumer spending, and reduced credit availability, are also major headwinds for brick-and-mortar stores.

Lithium

Supply is Growing, Demand is Surging

In 2023, global lithium supply is expected to exceed 1 million tonnes for the first time.¹¹ By year-end, the world's lithium supply is expected to be more than double the output from 2021 and exceed total production between 2015 and 2018.¹² The expansion in recent years is mainly attributable to projects in Chile and Australia. New projects in Australia, Brazil, and Quebec are expected to boost supply further. According to



projections, lithium supply will need to double again to 2 million tonnes by 2027 to keep up with demand.¹³ Lithium producer Livent reported strong appetite for lithium outside of China, especially in Japan and South Korea, two of the world's largest cathode producers.¹⁴ Similarly, leading producer Albemarle anticipates continued demand and plans to invest over \$1 billion to build two new production lines at its Kemerton plant in Western Australia by 2026. This investment will double the company's lithium hydroxide processing capacity.¹⁵

Telemedicine & Artificial Intelligence

AI Assistants Facilitate Patient Interactions

A recent study compared the responses of physicians and ChatGPT to real-world health questions, providing insight into the potential role of artificial intelligence (AI) assistants in medicine.¹⁶ To obtain a diverse sample, the study used a Reddit thread where millions of patients post medical questions and doctors respond. Licensed healthcare professionals preferred ChatGPT's responses 79% of the time, rating them as higher quality and more empathetic.¹⁷ Another example of generative AI's integration into healthcare is Urban Health Plan (UHP), a Federally Qualified Health Center (FQHC) based in New York. UHP increased its show rate for patients most likely to miss their appointments by 154% with targeted interventions using a prediction algorithm.¹⁸ Meanwhile, at UC San Diego Health, UW Health, and Stanford Health Care, physicians are testing a tool that automatically drafts responses to patients' inquiries about their symptoms, medications, and other medical concerns.¹⁹

Robotics & Artificial Intelligence

Robots Enter New Workforces

As COVID-19 pandemic conditions improve and a normalized cadence of healthcare procedures resumes, the use of robotic surgeries is surging. Use of Intuitive Surgical's da Vinci robot in procedures increased 26% year-over-year (YoY) in Q1 2023.²⁰ Installations of new da Vinci systems increased 12% YoY to 312 for the quarter, which brought their global installed base to nearly 7,800 robots.²¹ The growing demand for general surgery in the United States may also contribute to increased use of the company's robots. Also, the adoption of emerging AI applications in the robotics industry is on the rise. ABB Robotics launched its Robotic Item Picker, a new vision-based solution that accurately detects and picks items in warehouses and fulfillment centers.²² Boston Dynamics partnered with AI-software company Levatas to integrate OpenAI's ChatGPT into Boston Dynamics' robo-dog, Spot.²³ With ChatGPT and Google Assistant's voice technology, Spot can understand and converse with humans.

Autonomous & Electric Vehicles

EV Adoption Intensifies Around the World

Tesla intends to produce enough battery-grade lithium at its refinery outside Corpus Christi, Texas to support the production of 1 million electric cars annually.²⁴ To achieve this goal, Tesla plans to invest \$365 million in the lithium plant, with construction slated for completion in 2024 and production commencing in 2025.²⁵ BYD announced plans to manufacture EVs in Vietnam and that it expects support from the country's government. In addition, BYD intends to establish a local supply chain.²⁶ While China, Europe, and the U.S. are established hubs for electric car sales, India lags far behind. However, the International Energy Agency (IEA) reported a positive shift in India, with battery EV sales reaching almost 50,000 in 2022, four times greater than in 2021.²⁷ This number pales in comparison to China's EV sales of 4.4 million. However, Thierry Koskas, CEO of Stellantis, believes India's early stage EV sector offers great promise because urban and suburban car usage is high in India, making it ideal for EVs.²⁸



GM Cruise Picks Up the Pace

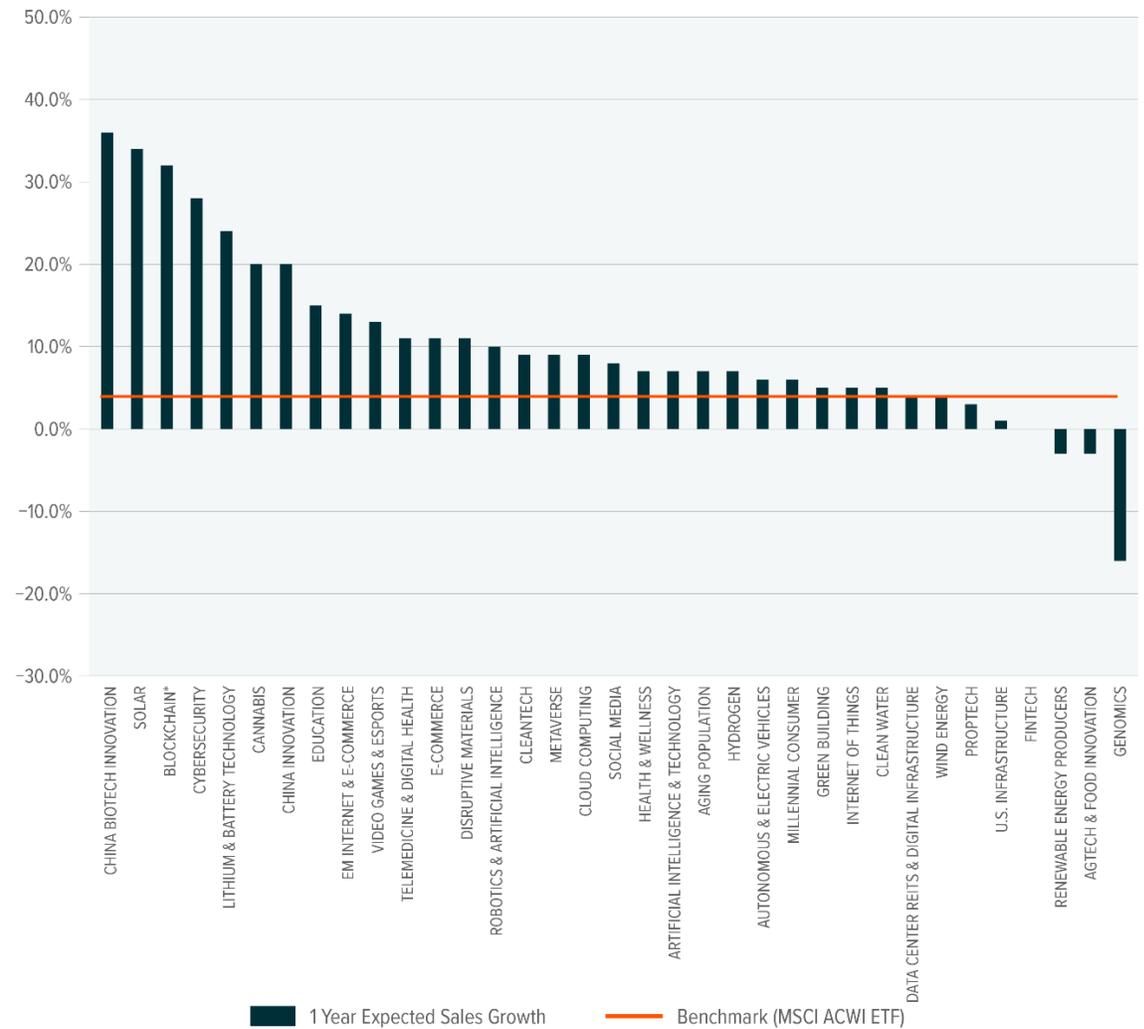
In January 2022, General Motors' autonomous vehicle Cruise launched fully driverless service in its robotaxis to the public in San Francisco.²⁹ By the end of April 2023, the service was 24/7 throughout the city.³⁰ The company plans to commence supervised testing, which involves a safety driver in the car, in Houston this month and to Dallas soon.³¹ Cruise's autonomous vehicles achieved a major milestone in February 2023 when they collectively drove 1 million driverless miles. The company expects driverless miles to double by mid-2023.³²

THE NUMBERS

The following charts examine returns and sales growth expectations by theme, based on their corresponding ETFs.

THEMATIC EXPECTED SALES GROWTH

Source: Bloomberg, April 30, 2023, Global X ETFs.

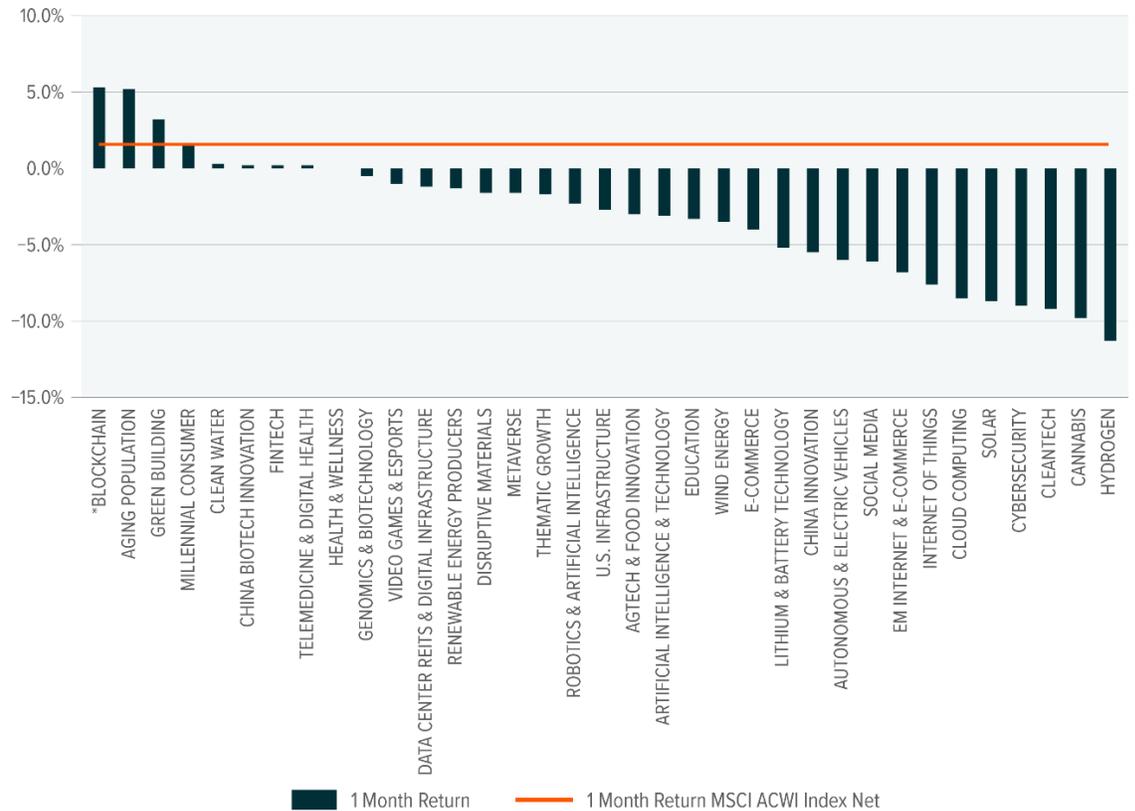


Note: Forward looking based on data and analysis from 4/30/2023.
 1 year annualized forward sales growth is the consensus analyst expectations for total sales growth in the next 12 months.
 *Blockchain reflects figures according to BKCH ETF



APRIL 2023 THEMATIC ETF RETURNS

Source: Bloomberg, April 30, 2023, Global X ETFs.



Note: The performance data quoted represents past performance and does not guarantee future results.
*Blockchain reflects figures according to BKCH ETF

Performance data quoted represents past performance and does not guarantee future results. Investment return and principal value of an investment will fluctuate so that an investors' shares, when sold or redeemed, may be worth more or less than their original cost. Current performance may be higher or lower than the performance quoted. High short-term performance of the fund is unusual and investors should not expect such performance to be repeated. For performance data current to the most recent month end, please call 1-888-493-8631 or visit www.globalxetfs.com.

Standard Performance		Cumulative % Data as of month end (4/30/23)					Avg. Annualized % Data as of quarter end (3/31/23)				
	Expense Ratio		1 Month	3 Month	Since Inception	1 Year	3 Year	5 Year	10 Year	Since Inception	
Robotics & Artificial Intelligence Inception Date 9/12/2016	0.69%	NAV	-2.09%	4.90%	72.32%	-13.17%	11.73%	1.76%	-	9.01%	
		Market Price	-2.31%	4.66%	73.02%	-11.90%	12.15%	1.66%	-	9.12%	
		Index	-2.10%	4.93%	76.58%	-12.84%	12.34%	2.00%	-	9.42%	
Fintech Inception Date 9/12/2016	0.68%	NAV	0.05%	-5.96%	46.31%	-34.96%	-3.12%	-1.14%	-	5.97%	
		Market Price	0.19%	-6.08%	46.51%	-34.82%	-3.20%	-1.17%	-	5.97%	
		Index	0.09%	-5.96%	51.48%	-34.89%	-2.75%	-0.65%	-	6.53%	
Internet Of Things Inception Date 9/12/2016	0.68%	NAV	-7.87%	-4.40%	115.07%	0.60%	22.65%	11.64%	-	13.82%	
		Market Price	-7.63%	-4.45%	115.64%	0.88%	22.74%	11.61%	-	13.82%	
		Index	-7.88%	-4.35%	119.55%	0.84%	23.10%	11.97%	-	14.18%	
Cloud Computing Inception Date 4/12/2019	0.68%	NAV	-8.29%	-6.14%	13.69%	-16.56%	8.45%	-	-	5.56%	
		Market Price	-8.50%	-6.46%	13.94%	-16.55%	8.49%	-	-	5.68%	
		Index	-8.26%	-6.02%	16.55%	-15.98%	9.13%	-	-	6.22%	
Social Media Inception Date 11/14/2011	0.65%	NAV	-5.84%	-4.37%	140.04%	-13.29%	7.82%	1.44%	10.50%	8.57%	
		Market Price	-6.05%	-4.95%	139.69%	-12.59%	7.92%	1.41%	10.55%	8.58%	
		Index	-5.81%	-4.22%	154.78%	-12.43%	8.32%	2.00%	11.04%	9.13%	



Artificial Intelligence & Technology Inception Date 5/11/2018	0.68%	NAV	-3.34%	3.45%	61.81%	-8.79%	16.64%	-	-	11.11%
		Market Price	-3.09%	4.24%	62.64%	-8.47%	16.89%	-	-	11.17%
		Index	-3.34%	3.55%	64.96%	-8.41%	17.18%	-	-	11.55%
Autonomous & Electric Vehicles Inception Date 4/13/2018	0.68%	NAV	-6.17%	-5.82%	58.24%	-12.79%	29.63%	-	-	11.10%
		Market Price	-6.04%	-5.72%	58.60%	-12.46%	29.87%	-	-	11.11%
		Index	-6.17%	-5.85%	59.65%	-12.56%	30.05%	-	-	11.29%
Lithium and Battery Tech Inception Date 7/22/2010	0.75%	NAV	-5.03%	-14.32%	129.68%	-17.27%	43.51%	15.50%	10.14%	7.20%
		Market Price	-5.22%	-14.83%	129.89%	-16.65%	43.92%	15.43%	10.22%	7.23%
		Index	-4.99%	-14.29%	143.89%	-16.87%	44.00%	15.66%	10.65%	7.71%
Genomics and Biotechnology Inception Date 4/5/2019	0.50%	NAV	-0.33%	-9.59%	-19.70%	-18.18%	-0.88%	-	-	-5.27%
		Market Price	-0.49%	-9.72%	-18.13%	-18.03%	-0.77%	-	-	-4.77%
		Index	-0.34%	-10.15%	-18.70%	-18.38%	-0.66%	-	-	-4.98%
Millennial Consumer Inception Date 5/4/2016	0.50%	NAV	1.17%	0.90%	107.51%	-17.73%	14.46%	8.72%	-	10.96%
		Market Price	1.55%	1.00%	106.88%	-17.92%	14.33%	8.63%	-	10.85%
		Index	1.22%	0.97%	114.34%	-17.42%	15.03%	9.25%	-	11.47%
Aging Population Inception Date 5/09/2016	0.50%	NAV	5.10%	4.79%	94.87%	-5.77%	10.49%	7.13%	-	9.37%
		Market Price	5.23%	4.80%	98.62%	-6.05%	10.40%	6.99%	-	9.65%
		Index	5.11%	4.82%	98.27%	-5.58%	10.73%	7.35%	-	9.64%
Health and Wellness Inception Date 5/9/2016	0.50%	NAV	-0.38%	0.04%	64.60%	-1.67%	14.93%	6.78%	-	7.55%
		Market Price	0.04%	0.30%	65.57%	-1.52%	14.69%	6.46%	-	7.58%
		Index	-0.35%	0.16%	69.19%	-1.33%	15.36%	7.14%	-	7.98%
E-Commerce Inception Date 11/27/2018	0.50%	NAV	-3.93%	-13.20%	17.68%	-18.49%	6.67%	-	-	4.78%
		Market Price	-3.99%	-13.28%	17.34%	-18.67%	6.52%	-	-	4.73%
		Index	-3.95%	-13.15%	19.93%	-18.12%	7.06%	-	-	5.25%
Us Infrastructure Development Inception Date 3/6/2017	0.47%	NAV	-2.58%	-4.66%	91.24%	1.17%	32.59%	12.82%	-	11.75%
		Market Price	-2.68%	-4.66%	91.10%	1.13%	32.61%	12.78%	-	11.76%
		Index	-2.57%	-4.58%	97.24%	1.65%	33.34%	13.40%	-	12.32%
Cannabis Inception Date 9/17/2019	0.51%	NAV	-9.17%	-34.55%	-93.63%	-71.48%	-42.79%	-	-	-52.83%
		Market Price	-9.79%	-35.28%	-93.81%	-71.54%	-43.07%	-	-	-53.11%
		Index	-9.54%	-35.74%	-94.66%	-72.58%	-45.12%	-	-	-55.06%
Video Games & Esports Inception Date 10/25/2019	0.50%	NAV	-0.94%	-1.03%	36.80%	-19.14%	8.03%	-	-	9.86%
		Market Price	-1.03%	-1.18%	36.77%	-18.76%	7.95%	-	-	9.88%
		Index	-0.92%	-0.87%	39.09%	-18.77%	8.58%	-	-	10.39%
Cybersecurity Inception Date 10/25/2019	0.51%	NAV	-8.88%	-3.44%	44.18%	-24.34%	17.44%	-	-	14.30%
		Market Price	-9.00%	-3.57%	46.69%	-24.20%	17.58%	-	-	14.92%
		Index	-8.86%	-3.34%	46.38%	-23.88%	17.94%	-	-	14.80%
Thematic Growth Inception Date 10/25/2019	0.50%	NAV	-2.04%	-8.20%	2.67%	-30.49%	5.89%	-	-	1.38%
		Market Price	-1.69%	-7.54%	3.94%	-30.23%	6.05%	-	-	1.64%
		Index	-2.05%	-8.21%	1.77%	-30.63%	5.61%	-	-	1.12%
Education Inception Date 7/10/2020	0.50%	NAV	-2.93%	-17.57%	-55.07%	-12.91%	-	-	-	-24.64%
		Market Price	-3.31%	-17.33%	-55.19%	-12.67%	-	-	-	-24.60%
		Index	-2.95%	-17.49%	-54.43%	-12.32%	-	-	-	-24.24%
Telemedicine & Digital Health Inception Date 7/29/2020	0.68%	NAV	-0.08%	-5.76%	-22.63%	-18.91%	-	-	-	-9.13%
		Market Price	0.17%	-6.00%	-22.89%	-19.39%	-	-	-	-9.33%
		Index	-0.02%	-5.95%	-21.73%	-18.81%	-	-	-	-8.75%
China Biotech Innovation Inception Date 9/22/2020	0.65%	NAV	-0.22%	-13.07%	-39.52%	-21.62%	-	-	-	-18.02%
		Market Price	0.22%	-12.80%	-39.85%	-21.52%	-	-	-	-18.34%
		Index	-0.26%	-13.01%	-38.49%	-21.04%	-	-	-	-17.45%
Cleantech Inception Date 10/27/2020	0.50%	NAV	-9.24%	-12.89%	-2.95%	-3.89%	-	-	-	2.80%
		Market Price	-9.23%	-13.52%	-3.49%	-3.85%	-	-	-	2.56%
		Index	-9.26%	-12.82%	-4.53%	-3.43%	-	-	-	2.12%
Data Center Reits & Digital Infrastructure Inception Date 10/27/2020	0.50%	NAV	-0.84%	-5.64%	-9.24%	-17.73%	-	-	-	-3.59%
		Market Price	-1.22%	-5.81%	-9.72%	-17.68%	-	-	-	-3.64%
		Index	-0.84%	-5.90%	-9.46%	-17.98%	-	-	-	-3.68%
Emerging Markets Internet & E-Commerce Inception Date 11/09/2020	0.65%	NAV	-6.93%	-13.45%	-51.98%	-2.67%	-	-	-	-24.20%
		Market Price	-6.83%	-13.38%	-51.55%	-0.89%	-	-	-	-23.95%
		Index	-6.89%	-13.28%	-51.28%	-1.47%	-	-	-	-23.75%
Renewable Energy Producers Inception Date 05/27/2015	0.66%	NAV	-1.45%	-8.23%	5.78%	-22.50%	2.56%	3.91%	-	0.91%
		Market Price	-1.29%	-8.59%	5.33%	-22.45%	2.13%	3.75%	-	0.83%
		Index	-1.45%	-8.17%	8.97%	-21.89%	2.96%	4.33%	-	1.29%
China Innovation Inception Date 02/22/2021	0.75%	NAV	-6.07%	-14.37%	-52.21%	-11.74%	-	-	-	-27.50%
		Market Price	-5.48%	-14.39%	-52.29%	-10.82%	-	-	-	-27.77%
		Index	-	-	-	-	-	-	-	-
Clean Water Inception Date 04/08/2021	0.50%	NAV	0.41%	-1.08%	0.37%	-2.42%	-	-	-	-0.02%
		Market Price	0.34%	-1.35%	0.09%	-2.75%	-	-	-	-0.13%
		Index	0.40%	-1.06%	0.96%	-2.16%	-	-	-	0.28%
Agtech and Food Innovation ETF Inception Date 07/12/2021	0.50%	NAV	-3.70%	-16.33%	-43.83%	-25.94%	-	-	-	-26.94%
		Market Price	-3.04%	-16.81%	-43.80%	-26.55%	-	-	-	-27.20%
		Index	-3.62%	-16.23%	-43.41%	-25.61%	-	-	-	-26.66%
Hydrogen Inception Date 07/12/2021	0.50%	NAV	-11.25%	-27.50%	-61.24%	-42.56%	-	-	-	-38.26%
		Market Price	-11.33%	-28.09%	-61.24%	-42.90%	-	-	-	-38.23%
		Index	-11.29%	-27.45%	-61.05%	-42.44%	-	-	-	-38.07%
Blockchain Inception Date 07/12/2021	0.50%	NAV	6.43%	12.05%	-75.29%	-67.99%	-	-	-	-57.26%
		Market Price	5.26%	10.84%	-75.40%	-67.81%	-	-	-	-57.10%
		Index	6.23%	11.38%	-76.02%	-68.73%	-	-	-	-57.95%



Solar Inception Date 09/08/2021	0.51%	NAV	-8.46%	-16.81%	-21.23%	-2.48%	-	-	-	-9.19%
		Market Price	-8.73%	-17.52%	-21.36%	-2.16%	-	-	-	-9.11%
		Index	-8.45%	-16.69%	-20.50%	-1.87%	-	-	-	-8.65%
Wind Energy Inception Date 09/08/2021	0.50%	NAV	-3.78%	-10.35%	-31.77%	-18.34%	-	-	-	-19.79%
		Market Price	-3.45%	-11.22%	-31.94%	-18.47%	-	-	-	-20.09%
		Index	-3.76%	-10.27%	-31.25%	-17.96%	-	-	-	-19.41%
Disruptive Materials Inception Date 01/24/22	0.59%	NAV	-1.65%	-14.72%	-18.15%	-26.03%	-	-	-	-14.40%
		Market Price	-1.59%	-15.17%	-17.85%	-26.29%	-	-	-	-14.18%
		Index	-1.59%	-14.61%	-17.63%	-25.67%	-	-	-	-13.99%
Green Building Inception Date 04/11/22	0.45%	NAV	2.68%	-4.61%	-14.53%	-	-	-	-	-
		Market Price	3.21%	-4.33%	-14.16%	-	-	-	-	-
		Index	2.73%	-4.49%	-14.48%	-	-	-	-	-
Metaverse Inception Date 04/26/22	0.50%	NAV	-2.14%	5.17%	-5.16%	-	-	-	-	-
		Market Price	-1.62%	5.20%	-4.82%	-	-	-	-	-
		Index	-2.16%	5.24%	-4.82%	-	-	-	-	-
Proptech Inception Date 04/11/23	0.50%	NAV	-	-	-0.12%	-	-	-	-	-
		Market Price	-	-	0.12%	-	-	-	-	-
		Index	-	-	-0.09%	-	-	-	-	-

P/S AND EV/S

Source: Bloomberg, data is as of 4/30/23 and 3/31/23, Global X ETFs.

Ticker	Name	P/S		EV/S	
		4/30/23	3/31/23	4/30/23	3/31/23
GNOM	Global X Genomics & Biotechnology ETF	6.20	6.29	5.71	5.76
BUG	Global X Cybersecurity ETF	5.24	5.76	4.99	5.51
CHB	Global X China Biotech Innovation ETF	4.86	4.89	4.62	4.34
VR	Global X Metaverse ETF	4.41	4.53	4.26	4.38
HYDR	Global X Hydrogen ETF	4.29	4.87	3.56	4.11
BOTZ	Global X Robotics & Artificial Intelligence ETF	3.84	4.10	4.07	4.15
CLOU	Global X Cloud Computing ETF	3.72	4.07	3.99	4.31
VPN	Global X Data Center REITs & Digital Infrastructure ETF	3.69	3.71	6.61	6.48
AGNG	Global X Aging Population ETF	3.58	3.73	4.26	4.41
HERO	Global X Video Games & Esports ETF	3.27	3.31	3.21	3.27
FINX	Global X FinTech ETF	3.19	3.15	3.69	3.43
SOCL	Global X Social Media ETF	3.03	3.25	2.83	3.03
AIQ	Global X Artificial Intelligence & Technology ETF	3.03	3.14	3.12	3.18
EDOC	Global X Telemedicine & Digital Health ETF	2.90	2.92	2.96	2.97
BKCH	Global X Blockchain ETF	2.76	2.32	3.69	3.13
SNSR	Global X Internet of Things ETF	2.53	2.77	2.79	3.00
AQWA	Global X Clean Water ETF	2.43	2.42	3.32	3.31
RNRG	Global X Renewable Energy Producers ETF	2.41	2.46	4.36	4.42
EWEB	Global X Emerging Markets Internet & E-commerce ETF	2.39	2.57	2.22	2.41
SPX	S&P 500 Index	2.35	2.34	2.67	2.64
GRNR	Global X Green Building ETF	2.28	2.25	4.06	4.02
KEJI	Global X China Innovation ETF	2.10	2.45	1.66	1.95
RAYS	Global X Solar ETF	2.06	2.52	2.64	3.07
MILN	Global X Millennial Consumer ETF	1.86	2.00	2.18	2.28
WNDY	Global X Wind Energy ETF	1.82	1.90	3.04	3.09
ACWI	MSCI ACWI Index	1.79	1.79	2.07	2.06
LIT	Global X Lithium and Battery Tech ETF	1.72	1.86	1.82	1.92
EDUT	Global X Education ETF	1.68	1.72	1.71	1.78
DMAT	Global X Disruptive Materials ETF	1.61	1.52	1.90	1.75
PTEC	Global X PropTech ETF	1.48	-	2.50	-
POTX	Global X Cannabis ETF	1.47	1.78	1.70	2.06
BFIT	Global X Health & Wellness ETF	1.36	1.31	1.53	1.47
PAVE	Global X U.S. Infrastructure ETF	1.35	1.40	1.63	1.68
CTEC	Global X Cleantech ETF	1.10	1.25	1.45	1.58
EBIZ	Global X E-commerce ETF	1.05	1.09	0.88	0.93
KROP	Global X AgTech & Food Innovation ETF	1.04	1.19	1.37	1.46
DRIV	Global X Autonomous & Electric Vehicles ETF	0.89	0.95	0.99	1.05

Note: P/S and EV/S refer to price-to-sales and enterprise value-to-sales, respectively.



F12M SALES GROWTH, PSG, AND EVSG

Source: Bloomberg, data is as of 4/30/23 and 3/31/23, Global X ETFs.

Ticker	Name	F12M Sales (%)		PSG		EVSG	
		4/30/23	3/31/23	4/30/23	3/31/23	4/30/23	3/31/23
CHB	Global X China Biotech Innovation ETF	35.8%	36.2%	0.14	0.13	0.13	0.12
RAYS	Global X Solar ETF	34.0%	47.6%	0.06	0.05	0.08	0.06
BKCH	Global X Blockchain ETF	31.8%	28.2%	0.09	0.08	0.12	0.11
BUG	Global X Cybersecurity ETF	28.1%	26.9%	0.19	0.21	0.18	0.20
LIT	Global X Lithium and Battery Tech ETF	23.7%	30.7%	0.07	0.06	0.08	0.06
POTX	Global X Cannabis ETF	20.0%	28.3%	0.07	0.06	0.09	0.07
KEJI	Global X China Innovation ETF	19.8%	22.5%	0.11	0.11	0.08	0.09
EDUT	Global X Education ETF	14.5%	11.3%	0.12	0.15	0.12	0.16
EWEB	Global X Emerging Markets Internet & E-commerce ETF	13.7%	14.5%	0.17	0.18	0.16	0.17
HERO	Global X Video Games & Esports ETF	13.3%	15.5%	0.25	0.21	0.24	0.21
EDOC	Global X Telemedicine & Digital Health ETF	11.3%	13.1%	0.26	0.22	0.26	0.23
EBIZ	Global X E-commerce ETF	11.1%	12.1%	0.09	0.09	0.08	0.08
DMAT	Global X Disruptive Materials ETF	10.6%	9.3%	0.15	0.16	0.18	0.19
BOTZ	Global X Robotics & Artificial Intelligence ETF	10.2%	9.7%	0.38	0.42	0.40	0.43
CTEC	Global X Cleantech ETF	9.4%	8.8%	0.12	0.14	0.15	0.18
VR	Global X Metaverse ETF	8.6%	8.2%	0.51	0.56	0.49	0.54
CLOU	Global X Cloud Computing ETF	8.5%	9.6%	0.44	0.43	0.47	0.45
SOCL	Global X Social Media ETF	7.6%	8.1%	0.40	0.40	0.37	0.37
BFIT	Global X Health & Wellness ETF	7.2%	6.4%	0.19	0.21	0.21	0.23
AIQ	Global X Artificial Intelligence & Technology ETF	7.1%	7.0%	0.43	0.45	0.44	0.46
AGNG	Global X Aging Population ETF	6.8%	5.5%	0.53	0.68	0.63	0.80
HYDR	Global X Hydrogen ETF	6.5%	8.2%	0.66	0.60	0.54	0.50
DRIV	Global X Autonomous & Electric Vehicles ETF	6.1%	6.6%	0.14	0.14	0.16	0.16
MILN	Global X Millennial Consumer ETF	6.0%	5.9%	0.31	0.34	0.36	0.38
GRNR	Global X Green Building ETF	5.3%	6.7%	0.43	0.34	0.76	0.60
SNSR	Global X Internet of Things ETF	5.2%	4.9%	0.49	0.57	0.54	0.62
AQWA	Global X Clean Water ETF	4.9%	4.9%	0.49	0.49	0.67	0.68
SPX	S&P 500 Index	4.7%	4.6%	0.50	0.51	0.56	0.57
ACWI	MSCI ACWI Index	4.0%	3.9%	0.44	0.45	0.51	0.52
VPN	Global X Data Center REITs & Digital Infrastructure ETF	4.0%	2.6%	0.92	1.45	1.65	2.54
WNDY	Global X Wind Energy ETF	3.6%	1.6%	0.51	1.19	0.85	1.93
PTEC	Global X PropTech ETF	3.4%	-	0.44	-	0.73	-
PAVE	Global X U.S. Infrastructure Development ETF	0.7%	0.8%	1.80	1.67	2.18	2.00
FINX	Global X FinTech ETF	-0.5%	-1.0%	-6.87	-3.03	-7.93	-3.30
RNRG	Global X Renewable Energy Producers ETF	-2.6%	1.2%	-0.91	2.01	-1.65	3.62
KROP	Global X AgTech & Food Innovation ETF	-2.9%	-3.0%	-0.36	-0.40	-0.48	-0.48
GNOM	Global X Genomics & Biotechnology ETF	-15.8%	-17.4%	-0.39	-0.36	-0.36	-0.33

Note: F12 Sales Growth refers to the consensus analyst expectations for total sales growth in the next 12 months.

*Please note that month-over-month variations in F12M Sales may be the result of Bloomberg coverage and estimates of underlying securities.

PSG and EVSG refer to Price-to-Sales over F12 Sales Growth and Enterprise Value over F12 Sales Growth, respectively.

N/As reflect a negative growth number in the denominator and similar to traditional PEG ratios aren't typically displayed as such (hence the N/A).

INTRO TO THEMATIC INVESTING COURSE – ELIGIBLE FOR CE CREDIT

Global X has developed an interactive, self-guided [Intro to Thematic Investing course](#), that is designed to share the latest ideas and best practices for incorporating thematic investing into a portfolio.

This program has been accepted for 1.0 hour of CE credit towards the CFP®, CIMA®, CIMC®, CPWA®, or RMA certifications. To receive credit, course takers must submit accurate and complete information on the



requested forms, complete the entire course, and receive a 70% or higher on the Intro to Thematic Investing Quiz.

For Canadian course takers: This program has been reviewed by FP Canada and qualifies for 1 FP Canada-Approved CE Credit, in the category of Product Knowledge, towards the CFP® certification or QAFP™ certification. To receive credit, course takers must submit accurate and complete information (including Job Title) on the requested forms, complete the entire course, and receive a 70% or higher on the Intro to Thematic Investing Quiz.

Questions on receiving CE credit may be sent to: Education@globalxetfs.com

KEEP UP WITH THE LATEST RESEARCH FROM GLOBAL X

To learn more about the disruptive themes changing our world, read the latest research from Global X, including:

- [New York Auto Show Recap: Electric Vehicle Innovation Prominently on Display](#)
- [Private Market Perspectives: Road to AI Supremacy Goes Through Venture Land](#)
- [Chile Lithium Update: Boric's Plans Fall Short of Nationalization](#)
- [The Consumer Pulse: PropTech Adoption](#)
- [Introducing PTEC: The Case for Property Technology](#)

ETF HOLDINGS AND PERFORMANCE:

To see individual ETF holdings and current performance across the Global X Thematic Growth Suite, including information on the indexes shown, click these links:

- **Disruptive Technology:** [Artificial Intelligence & Technology ETF \(AIQ\)](#), [Robotics & Artificial Intelligence ETF \(BOTZ\)](#), [Cybersecurity ETF \(BUG\)](#), [Cloud Computing ETF \(CLOU\)](#), [Autonomous & Electric Vehicles ETF \(DRIV\)](#), [FinTech ETF \(FINX\)](#), [Video Games & Esports ETF \(HERO\)](#), [Lithium and Battery Tech ETF \(LIT\)](#), [Internet of Things ETF \(SNSR\)](#), [Social Media ETF \(SOCL\)](#), [China Biotech Innovation ETF \(CHB\)](#), [Data Center REITs & Digital Infrastructure ETF \(VPN\)](#), [Emerging Markets Internet & E-Commerce ETF \(EWEB\)](#), [AgTech & Food Innovation ETF \(KROP\)](#), [Blockchain ETF \(BKCH\)](#), [Blockchain & Bitcoin Strategy ETF \(BITS\)](#), [Metaverse ETF \(VR\)](#), [PropTech ETF \(PTEC\)](#)
- **People and Demographics:** [Cannabis ETF \(POTX\)](#), [Millennial Consumer ETF \(MILN\)](#), [Health & Wellness ETF \(BFIT\)](#), [E-Commerce ETF \(EBIZ\)](#), [Genomics & Biotechnology ETF \(GNOM\)](#), [Aging Population ETF \(AGNG\)](#), [Telemedicine & Digital Health ETF \(EDOC\)](#), [Education ETF \(EDUT\)](#)
- **Physical Environment:** [U.S. Infrastructure Development ETF \(PAVE\)](#), [CleanTech ETF \(CTEC\)](#), [Renewable Energy Producers \(RNRG\)](#), [Clean Water ETF \(AQWA\)](#), [Hydrogen ETF \(HYDR\)](#), [Solar ETF \(RAYS\)](#), [Wind Energy ETF \(WNDY\)](#), [Disruptive Materials ETF \(DMAT\)](#), [Green Building ETF \(GRNR\)](#)
- **Multi-Theme:** [Thematic Growth ETF \(GXTG\)](#), [China Innovation ETF \(KEJI\)](#)

Footnotes

1. U.S. Department of Commerce. (2023, April 25). CHIPS for America Outlines Vision for the National Semiconductor Technology Center.
2. Ibid.
3. South China Morning Post. (2023, May 7). China gave 190 chip firms US\$1.75 billion in subsidies in 2022 as it seeks semiconductor self-sufficiency.
4. Ibid.
5. Ibid.
6. CNN. (2023, April 27). Amazon posts \$3.2 billion profit as it goes through multiple rounds of layoffs.
7. Benedict Evans. (2023, March 6). Retail, search and Amazon's \$40bn 'advertising' business.
8. Business Insider. (2022, December 7). Here's the latest on Amazon's \$31 billion ad business, which continues to grow despite the economic upheaval.



9. Yahoo Finance. (2023, April 24). Retail store closures 'to sharply accelerate going forward': UBS research.
10. Ibid.
11. Benchmark Minerals. (2023, April 28). Global lithium supply forecast to hit 1 million tonnes for first time.
12. Ibid.
13. Ibid.
14. Reuters. (2023, May 2). Livent boosts forecast on bullish outlook for lithium prices, demand.
15. Benchmark Minerals. (2023, May 5). Albemarle plans to double Kemerton hydroxide capacity as Australian lithium chemical production ramps up.
16. UC San Diego Today. (2023, April 28). Study Finds ChatGPT Outperforms Physicians in High-Quality, Empathetic Answers to Patient Questions.
17. Ibid.
18. Healthcare IT News. (2023, May 8). This FQHC slashed its patient no-show rate with AI in 3 months.
19. CBS News. (2023, May 8). Question for your doctor? Artificial intelligence can help..
20. Fierce Biotech. (2023, April 19). Intuitive sees robotic surgeries skyrocket in Q1 as procedures inch toward pre-pandemic norms.
21. Ibid.
22. Robotics & Automation News. (2023, April 29). ABB unveils AI-enabled robotic item picker for warehouses.
23. Business Insider. (2023, May 4). These robot dogs can't bark — but they can speak in full sentences thanks to ChatGPT.
24. Electrek. (2023, May 8). Tesla breaks ground at new Lithium Refinery, aims to support 1 million electric cars.
25. Ibid.
26. Caixin Global. (2023, May 9). BYD to Build Electric Vehicles in Vietnam in Southeast Asia Push.
27. CNBC. (2023, May 4). Auto giants are setting their sights on a new growth market for EVs: India.
28. Ibid.
29. Dallas Innovates. (2023, May 1). Cruise Is Operating Robotaxis 24/7 in San Francisco—and Dallas Might Be Its Next Stop.
30. Ibid.
31. Tech Crunch. (2023, May 10). Cruise expands supervised self-driving ride-hailing to Houston and Dallas.
32. Dallas Innovates. (2023, May 1). Cruise Is Operating Robotaxis 24/7 in San Francisco—and Dallas Might Be Its Next Stop.

Investing involves risk, including the possible loss of principal. International investments may involve risk of capital loss from unfavorable fluctuation in currency values, from differences in generally accepted accounting principles or from economic or political instability in other nations. Emerging markets involve heightened risks related to the same factors as well as increased volatility and lower trading volume. Narrowly focused investments may be subject to higher volatility. The funds are non-diversified.

The companies in which the Disruptive Technology Funds invest may be subject to rapid changes in technology, intense competition, rapid obsolescence of products and services, loss of intellectual property protections, evolving industry standards and frequent new product productions, and changes in business cycles and government regulation. There are additional risks associated with investing in mining industries.

The Genomics, Healthcare, Pharmaceutical, Medical Device and Biotechnology sectors can be affected by government regulations, rapid product obsolescence, intense industry competition and loss or impairment of patents or intellectual property rights.

Carefully consider the Funds' investment objectives, risk factors, charges, and expenses before investing. This and additional information can be found in the Funds' summary or full prospectus, which may be obtained by calling 1.888.493.8631, or by visiting globalxetfs.com. Please read the prospectus carefully before investing.

Global X Management Company LLC serves as an advisor to Funds. The Funds are distributed by SEI Investments Distribution Co. (SIDCO), which is not affiliated with Global X Management Company LLC or Mirae Asset Global Investments.

Shares of ETFs are bought and sold at market price (not NAV) and are not individually redeemed from the Fund. Brokerage commissions will reduce returns. Beginning October 15, 2020, market price returns are based on the official closing price of an ETF share or, if the official closing price isn't available, the midpoint between the national best bid and national best offer ("NBBO") as of the time the ETF calculates current NAV per share. Prior to October 15, 2020, market price returns were based on the midpoint between the Bid and Ask price. NAVs are calculated using prices as of 4:00 PM Eastern Time. The returns shown do not represent the returns you would receive if you traded shares at other times.

Indices are unmanaged and do not include the effect of fees, expenses or sales charges. One cannot invest directly in an index.

This material represents an assessment of the market environment at a specific point in time and is not intended to be a forecast of future events, or a guarantee of future results. This information is not intended to be individual or personalized investment or tax advice and should not be used for trading purposes. Please consult a financial advisor or tax professional for more information regarding your investment and/or tax situation.

