

GLOBAL X ETFs RESEARCH

The Next Big Theme: December 2021

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Topic: Disruptive

Technology, Physical
Environment, People &
Demographics**E-commerce***Consumers Extend the Holiday Season***Related Posts**[China Innovation ETF \(KEJI\):
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Strong holiday season sales topped off 2021 e-commerce spending despite sparse discounts. U.S. consumers spending online totaled \$109.8 billion through the month of November until Cyber Monday, an 11.9% increase from the same period last year.¹ Although sales on Thanksgiving Day, Black Friday, and Cyber Monday were consistent or slightly less than 2020, many consumers purchased holiday gifts prior to Thanksgiving Day because of the supply chain constraints. A survey noted that about 61% of U.S. consumers did their holiday shopping in advance.² Store discounts were much less this year than in previous years. Average discounts for electronics were 12% on Cyber Monday, compared with 27% last year.³ However, fewer deals didn't affect sales: in Q3 2021, total U.S. e-commerce sales increased 6.8% from Q3 2020 to \$204.6 billion.⁴

Electric Vehicles*EVs Leading the Charge*

Global auto manufacturers are strengthening their foothold within the electric vehicle (EV) ecosystem. At the end of 2020, there were 1,019,260 EVs registered in the U.S., only 2.5% of the automotive market.⁵ But within the first three months of 2021, U.S. consumers registered new EVs at 3x the rate of other new cars.⁶ EV sales in the U.S. more than doubled in 2021, led by Ford and Tesla. Surveyed automotive executives are confident President Biden will reach his goal of having half of new vehicles sold in the U.S. be electric by 2030. On average, surveyed executives expect 52% of new vehicle sales in the U.S. will be electric by then.⁷ This figure is consistent with the expectations of executives surveyed in Japan and China. In Europe, 13% of auto sales were fully electric in October, when overall plugin vehicle sales increased 26% year-over-year.⁸

Social Media*Metaverse Becoming Real*

The metaverse continues to expand with more industries taking part, including real estate. Users can now buy digital tracts of land in the metaverse. Among real estate opportunities, consumers can buy virtual concert venues, shopping malls, houses, and monuments. The land represents future monetization opportunities for owners, as they could lease their space to popular brand names, for example. Also, Meta, arguably the most well-known name in the metaverse, released several new developments. The company's Haptic Glove is progressing towards becoming the world's first high-speed microfluidic processor that allows touch in the virtual world. In addition, Meta announced plans to reintegrate cryptocurrency ads onto its services. And the company updated its Quest headset to include cloud backups, a mixed reality camera, and more.

Cloud Computing

AWS Reinvents for the New Normal

Cloud computing quickly became an integral part of the economy during the pandemic. It's estimated that the average proportion of IT spending on the cloud will jump from 8.9% in 2020 to 12.4% in 2025.⁹ And now Amazon Web Services (AWS) has plans to expand its sustainable architecture, as announced at the company's annual customer conference, AWS re:Invent 2021. Among its goals, AWS plans to limit energy consumption when running code and storing and processing data. It plans to release tools such as Control Tower for businesses to optimize data residency, Compute Optimizer for resource efficiency, and CloudWatch to launch new features. AWS wants to enhance its storage capabilities, especially for the retrieval of rarely accessed data. In addition, AWS is focusing on enhanced processors for greater computational power, directing its efforts towards machine learning and rolling out 5G services.

Internet of Things

Global Government Chip Effort

The global semiconductor shortage reached an all-time high after months of waiting for Congress to pass and fund the \$52 billion CHIPS for America Act. Top chip and computing executives signed a letter designed to strengthen the Facilitating American-Built Semiconductors (FABS) Act and include an investment tax credit for chip design and manufacturing. Global automakers estimate over \$100 billion in revenue losses this past year due to semiconductor chip shortages.¹⁰ In recent months, Apple, Ford, and General Motors, among other companies, slowed production of their products largely due to the chip shortage, which also contributed to rising inflation. Globally, the European Union is considering easing restrictions on state aid for the semiconductor industry after France's pleas for an interventionist approach.

Cybersecurity

Cyberattacks on the Rails

The U.S. federal government imposed two cybersecurity mandates on railroad and rail transit systems considered higher risk. The new regulations require critical passenger and freight railways to report cyberattacks to the government, and they must designate a cybersecurity specialist to coordinate with the Transportation Security Administration (TSA) and Cybersecurity and Infrastructure Security Agency (CISA). The mandates also require an incident response plan and frequent vulnerability assessments to address cybersecurity gaps. These rules are an extension of previous Department of Homeland Security (DHS)



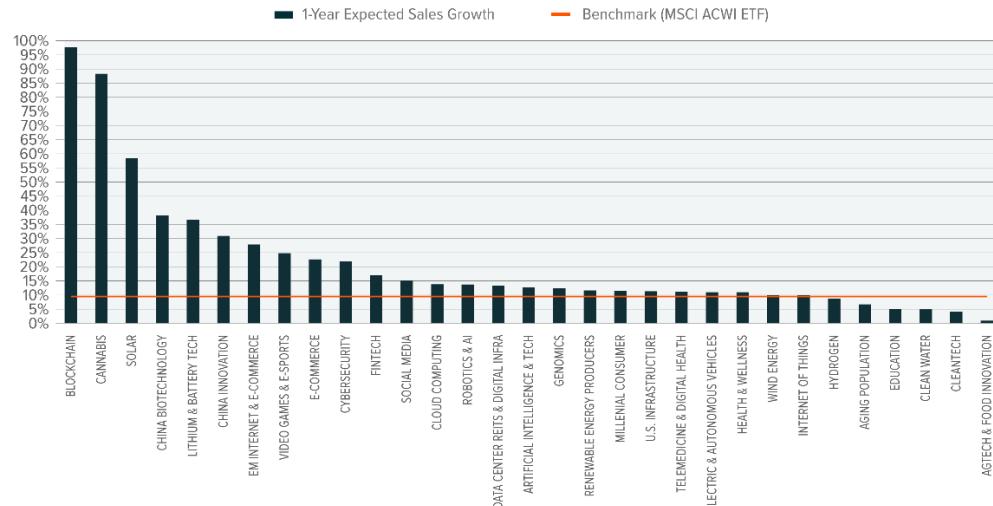
directives that resulted from major cyberattacks in 2021, notably the Colonial Pipeline hack. The DHS intends to implement similar measures for the aviation industry in the future.

THE NUMBERS

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

THEMATIC SALES GROWTH

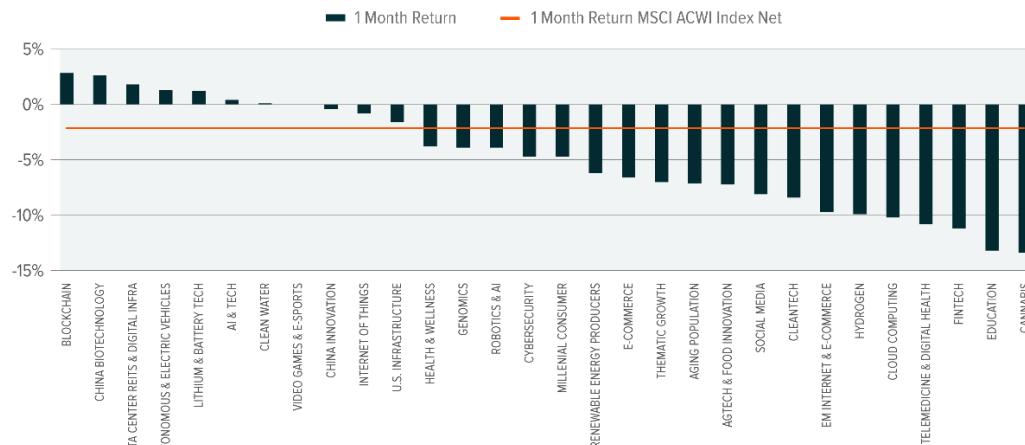
Source: Bloomberg, November 30, 2021, Global X ETFs.



Note: Forward looking based on data and analysis from 11/30/2021.
1 year annualized forward sales growth is the consensus analyst expectations for total sales growth in the next 12 months.

NOVEMBER 2021 THEMATIC ETF RETURNS

Source: Bloomberg, November 30, 2021, Global X ETFs.



Note: The performance data quoted represents past performance and does not guarantee future results.



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.globaletfs.com.

Standard Performance			Cumulative % Data as of month end 11/30/21				Avg. Annualized % Data as of quarter end 9/30/21			
	Gross 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	0.68%	NAV	-3.46%	-1.25%	151.14%	32.03%	18.03%	19.98%	-	20.28%
		Market Price	-3.93%	-1.28%	150.88%	31.34%	17.99%	19.76%	-	20.22%
		Index	-3.40%	-1.16%	155.62%	33.05%	18.45%	20.39%	-	20.67%
		NAV	-11.09%	-11.61%	202.75%	26.63%	18.77%	25.76%	-	25.88%
Fintech Inception Date 9/12/2016	0.68%	Market Price	-11.22%	-11.28%	203.55%	26.37%	18.75%	25.65%	-	25.85%
		Index	-11.09%	-11.55%	212.71%	27.41%	19.50%	26.55%	-	26.67%
		NAV	-0.69%	-0.79%	161.33%	38.75%	22.36%	19.44%	-	20.02%
		Market Price	-0.76%	-0.84%	161.95%	38.55%	22.51%	19.31%	-	20.06%
Internet Of Things Inception Date 9/12/2016	0.68%	Index	-0.66%	-0.70%	165.90%	39.38%	22.76%	19.85%	-	20.41%
		NAV	-10.25%	-7.16%	88.54%	22.57%	-	-	-	30.94%
		Market Price	-10.15%	-7.06%	89.63%	22.61%	-	-	-	31.17%
		Index	-10.18%	-7.01%	91.56%	23.36%	-	-	-	31.66%
Social Media Inception Date 11/14/2011	0.65%	NAV	-8.16%	-14.78%	286.57%	25.41%	24.02%	19.85%	-	15.63%
		Market Price	-8.12%	-15.11%	285.39%	24.68%	24.10%	19.70%	-	15.62%
		Index	-8.12%	-14.66%	308.34%	26.10%	24.72%	20.54%	-	16.25%
		Market Price	-0.28%	-0.44%	114.28%	29.17%	24.63%	-	-	23.51%
Artificial Intelligence & Technology Inception Date 5/11/2018	0.68%	Index	0.38%	-0.06%	115.98%	28.57%	24.54%	-	-	23.45%
		NAV	-0.26%	-0.33%	117.21%	29.80%	25.07%	-	-	23.93%
		Market Price	1.30%	5.88%	112.47%	63.08%	25.01%	-	-	20.62%
		Index	1.33%	6.09%	113.03%	62.81%	24.93%	-	-	20.65%
Autonomous & Electric Vehicles Inception Date 4/13/2018	0.68%	NAV	1.34%	6.03%	113.99%	63.86%	25.28%	-	-	20.80%
		Market Price	1.89%	8.59%	250.14%	107.81%	38.05%	30.15%	13.37%	10.66%
		Index	1.94%	8.96%	269.28%	108.43%	38.08%	30.28%	13.75%	11.15%
		Market Price	-3.69%	-14.41%	35.06%	24.02%	-	-	-	16.21%
Genomics And Biotechnology Inception Date 4/5/2019	0.50%	NAV	-3.88%	-14.72%	37.32%	24.04%	-	-	-	17.27%
		Market Price	-3.64%	-14.32%	36.97%	24.47%	-	-	-	16.79%
		Index	-4.71%	-4.90%	192.12%	38.10%	22.36%	22.52%	-	22.09%
		Market Price	-4.72%	-5.20%	190.80%	38.26%	22.41%	22.53%	-	22.04%
Millennial Consumer Inception Date 5/4/2016	0.50%	Index	-4.66%	-4.77%	199.95%	38.85%	23.00%	23.13%	-	22.65%
		NAV	-7.34%	-11.29%	87.06%	14.19%	10.02%	13.06%	-	13.65%
		Market Price	-7.13%	-11.27%	91.56%	13.41%	9.59%	12.84%	-	13.94%
		Index	-7.34%	-11.27%	89.88%	14.43%	10.23%	13.35%	-	13.94%
Aging Population Inception Date 5/10/2016	0.50%	NAV	-4.92%	-8.49%	95.10%	32.05%	14.31%	14.09%	-	13.77%
		Market Price	-3.84%	-7.79%	98.59%	31.28%	14.13%	13.91%	-	13.88%
		Index	-4.90%	-8.46%	99.64%	32.54%	14.72%	14.54%	-	14.23%
		Market Price	-6.48%	-10.19%	96.45%	11.71%	-	-	-	28.35%
E-Commerce Inception Date 11/27/2018	0.50%	NAV	-6.55%	-10.29%	96.11%	11.06%	-	-	-	28.17%
		Market Price	-6.54%	-10.18%	99.03%	12.18%	-	-	-	28.93%
		Index	-6.54%	-10.18%	99.03%	12.18%	-	-	-	28.93%
		Market Price	-1.59%	-0.15%	86.03%	51.55%	14.72%	-	-	12.86%
Us Infrastructure Development Inception Date 3/6/2017	0.47%	Market Price	-1.56%	-0.04%	86.17%	51.43%	14.78%	-	-	12.87%
		Index	-1.55%	-0.04%	90.43%	52.45%	15.29%	-	-	13.40%
		NAV	-14.25%	-30.84%	68.15%	26.00%	-	-	-	-36.71%
		Market Price	-13.40%	-30.28%	68.57%	24.91%	-	-	-	-37.43%
Cannabis Inception Date 9/17/2019	0.51%	Index	-14.43%	-31.04%	71.78%	23.28%	-	-	-	-40.23%
		NAV	0.03%	-2.89%	98.84%	4.84%	-	-	-	39.29%
		Market Price	0.00%	-2.86%	98.56%	3.93%	-	-	-	38.85%
		Index	0.03%	-2.78%	101.03%	5.42%	-	-	-	39.98%
Cybersecurity Inception Date 10/25/2019	0.50%	NAV	-4.65%	-2.37%	109.75%	39.92%	-	-	-	43.57%
		Market Price	-4.67%	-2.18%	114.12%	40.26%	-	-	-	45.04%
		Index	-4.62%	-2.26%	109.99%	40.51%	-	-	-	43.55%
		NAV	-7.02%	-10.38%	90.79%	47.90%	-	-	-	42.88%
Thematic Growth Inception Date 10/25/2019	0.50%	Market Price	-6.97%	-10.06%	92.94%	47.10%	-	-	-	43.25%
		Index	-7.06%	-10.51%	89.72%	47.27%	-	-	-	42.47%
		NAV	-12.80%	-18.74%	37.19%	-32.44%	-	-	-	-23.13%
		Market Price	-13.23%	-18.79%	37.39%	-32.81%	-	-	-	-23.47%
Education Inception Date 7/10/2020	0.50%	Index	-12.72%	-18.62%	36.75%	-32.10%	-	-	-	-22.71%
		NAV	-10.97%	-11.59%	7.19%	5.82%	-	-	-	13.93%
		Market Price	-10.78%	-11.84%	7.13%	5.26%	-	-	-	13.82%
		Index	-10.95%	-11.50%	8.06%	6.61%	-	-	-	14.70%
Telemedicine & Digital Health Inception Date 7/29/2020	0.68%	NAV	2.05%	-3.21%	5.77%	5.81%	-	-	-	7.26%
		Market Price	2.63%	-2.62%	5.83%	4.14%	-	-	-	6.48%
		Index	2.11%	-3.02%	6.57%	6.50%	-	-	-	7.96%
		Market Price	-8.38%	0.69%	34.99%	-	-	-	-	-
China Biotech Innovation Date Inception Date 9/22/2020	0.67%	Index	-8.07%	1.09%	32.57%	-	-	-	-	-
		NAV	2.29%	-0.28%	19.93%	-	-	-	-	-
		Market Price	1.83%	-0.78%	19.93%	-	-	-	-	-
		Index	2.32%	-0.27%	20.02%	-	-	-	-	-
Cleantech Inception Date 10/27/2020	0.50%	NAV	2.29%	-0.28%	19.93%	-	-	-	-	-
		Market Price	-8.38%	0.69%	34.99%	-	-	-	-	-
		Index	-8.07%	1.09%	32.57%	-	-	-	-	-
		Market Price	1.83%	-0.78%	19.93%	-	-	-	-	-
Data Center Reits & Digital Infrastructure Inception Date 10/27/2020	0.50%	Index	2.32%	-0.27%	20.02%	-	-	-	-	-
		NAV	2.29%	-0.28%	19.93%	-	-	-	-	-
		Market Price	-8.38%	0.69%	34.99%	-	-	-	-	-



Emerging Markets Internet & E-Commerce	0.65%	NAV	-10.26%	-17.36%	-27.25%	-	-	-	-
Inception Date 11/09/2020		Market Price	-9.67%	-16.49%	-27.38%	-	-	-	-
		Index	-10.17%	-17.15%	-26.71%	-	-	-	-
Renewable Energy Producers	0.65%	NAV	-6.24%	-3.90%	33.87%	8.87%	12.58%	10.30%	-
Inception Date 05/27/2015		Market Price	-6.24%	-3.96%	33.84%	8.44%	12.63%	10.14%	-
		Index	-6.22%	-3.82%	37.27%	9.43%	13.17%	10.79%	-
China Innovation	0.75%	NAV	-0.73%	-1.35%	-23.92%	-	-	-	-
Inception Date 02/22/2021		Market Price	-0.42%	-0.47%	-24.04%	-	-	-	-
		Index	-3.70%	-3.71%	-20.92%	-	-	-	-
Clean Water	0.50%	NAV	-0.24%	-2.34%	11.52%	-	-	-	-
Inception Date 04/08/2021		Market Price	0.12%	-2.95%	11.79%	-	-	-	-
		Index	-0.25%	-2.28%	11.74%	-	-	-	-
Atech & Food Innovation ETF	0.50%	NAV	-7.62%	-15.91%	-22.02%	-	-	-	-
Inception Date 07/12/2021		Market Price	-7.22%	-15.34%	-21.39%	-	-	-	-
		Index	-7.61%	-15.82%	-21.91%	-	-	-	-
Hydrogen	0.50%	NAV	-9.10%	3.66%	-2.64%	-	-	-	-
Inception Date 07/12/2021		Market Price	-9.90%	2.40%	-2.96%	-	-	-	-
		Index	-9.09%	3.75%	-2.49%	-	-	-	-
Blockchain	0.50%	NAV	2.90%	11.29%	29.27%	-	-	-	-
Inception Date 07/12/2021		Market Price	2.83%	11.96%	29.51%	-	-	-	-
		Index	2.69%	11.14%	29.22%	-	-	-	-
Solar ETF	0.50%	NAV	-7.85%	-	6.24%	-	-	-	-
Inception Date 09/08/2021		Market Price	-8.46%	-	6.04%	-	-	-	-
		Index	-7.82%	0.22%	6.36%	-	-	-	-
Wind Energy ETF	0.50%	NAV	-9.73%	-	-4.27%	-	-	-	-
Inception Date 09/08/2021		Market Price	-10.31%	-	-4.35%	-	-	-	-
		Index	-9.67%	-5.80%	-4.13%	-	-	-	-

P/S AND EV/S

Source: Bloomberg, data is as of 11/30/21 and 10/31/21, Global X ETFs.

Ticker	Name	P/S		EV/S	
		11/30/21	10/31/21	11/30/21	10/31/21
BKCH	Global X Blockchain ETF	15.88	19.75	20.76	27.46
GNOM	Global X Genomics & Biotechnology ETF	9.81	11.44	10.05	10.95
CLOU	Global X Cloud Computing ETF	8.56	11.38	11.03	11.78
BUG	Global X Cybersecurity ETF	8.52	9.19	10.15	9.48
HYDR	Global X Hydrogen ETF	8.42	9.56	8.06	10.60
FINX	Global X FinTech ETF	7.20	7.91	8.22	9.12
CHB	Global X China Biotech Innovation ETF	7.14	7.33	7.00	6.88
VPN	Global X Data Center REITs & Digital Infrastructure ETF	6.55	6.47	7.49	7.50
SOCL	Global X Social Media ETF	5.42	6.21	5.22	6.12
KEJI	Global X China Innovation ETF	5.34	5.19	4.20	4.50
BOTZ	Global X Robotics & Artificial Intelligence ETF	4.67	4.37	4.66	4.36
AGNG	Global X Aging Population ETF	4.41	4.82	5.02	5.57
HERO	Global X Video Games & Esports ETF	4.24	4.26	4.10	4.20
EDOC	Global X Telemedicine & Digital Health ETF	4.18	4.71	5.89	5.04
AIQ	Global X Artificial Intelligence & Technology ETF	4.06	4.10	4.16	4.25
POTX	Global X Cannabis ETF	3.84	4.30	8.22	9.44
RAYS	Global X Solar ETF	3.62	3.51	4.72	4.60
RNRG	Global X Renewable Energy Producers ETF	3.58	3.85	5.75	6.16
SNSR	Global X Internet of Things ETF	3.29	3.15	3.61	3.69
MILN	Global X Millennial Consumer ETF	3.26	3.49	3.64	3.92
SPX	S&P 500 Index	3.04	3.11	3.33	3.41
LIT	Global X Lithium and Battery Tech ETF	2.95	3.36	3.17	3.76
AQWA	Global X Clean Water ETF	2.82	2.86	3.80	3.83
EWEB	Global X Emerging Markets Internet & E-commerce ETF	2.77	3.22	2.69	3.14
ACWI	ACWI Index	2.17	2.24	2.50	2.60
EBIZ	Global X E-commerce ETF	1.97	2.16	2.07	2.32
WNDY	Global X Wind Energy ETF	1.95	1.88	3.06	2.68
EDUT	Global X Education ETF	1.95	2.39	2.20	2.49
CTEC	Global X Cleantech ETF	1.89	2.04	2.17	2.34
KROP	Global X AgTech & Food Innovation ETF	1.68	1.60	2.07	2.03
PAVE	Global X U.S. Infrastructure Development ETF	1.65	1.72	1.94	2.03
BFIT	Global X Health & Wellness ETF	1.64	1.71	1.82	1.90
DRIV	Global X Autonomous & Electric Vehicles ETF	1.35	1.33	1.49	1.49

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



F12 MONTH SALES GROWTH, PSG, AND EVSG

Source: Bloomberg, data is as of 11/30/21 and 10/31/21, Global X ETFs.

Ticker	Name	F12M Sales (%)		PSG		EVSG	
		11/30/21	10/31/21	11/30/21	10/31/21	11/30/21	10/31/21
BKCH	Global X Blockchain ETF	97.7%	110.1%	0.16	0.18	0.21	0.25
POTX	Global X Cannabis ETF	88.3%	74.5%	0.04	0.06	0.09	0.13
RAYS	Global X Solar ETF	58.3%	43.4%	0.06	0.08	0.08	0.11
CHB	Global X China Biotech Innovation ETF	38.2%	40.3%	0.19	0.18	0.18	0.17
LIT	Global X Lithium and Battery Tech ETF	36.7%	33.5%	0.08	0.10	0.09	0.11
KEJI	Global X China Innovation ETF	30.9%	35.8%	0.17	0.15	0.14	0.13
EWEB	Global X Emerging Markets Internet & E-commerce ETF	27.9%	36.7%	0.10	0.09	0.10	0.09
HERO	Global X Video Games & Esports ETF	24.8%	27.9%	0.17	0.15	0.17	0.15
EBIZ	Global X E-commerce ETF	22.6%	25.0%	0.09	0.09	0.09	0.09
BUG	Global X Cybersecurity ETF	21.9%	24.0%	0.39	0.38	0.46	0.39
FINX	Global X FinTech ETF	17.0%	14.6%	0.42	0.54	0.48	0.63
SOCL	Global X Social Media ETF	15.1%	14.0%	0.36	0.44	0.35	0.44
CLOU	Global X Cloud Computing ETF	13.8%	16.0%	0.62	0.71	0.80	0.74
BOTZ	Global X Robotics & Artificial Intelligence ETF	13.7%	1.3%	0.34	3.31	0.34	3.30
VPN	Global X Data Center REITs & Digital Infrastructure ETF	13.3%	12.4%	0.49	0.52	0.56	0.61
AIQ	Global X Artificial Intelligence & Technology ETF	12.8%	11.9%	0.32	0.34	0.32	0.36
GNOM	Global X Genomics & Biotechnology ETF	12.3%	5.3%	0.79	2.16	0.81	2.07
RNRG	Global X Renewable Energy Producers ETF	11.6%	18.1%	0.31	0.21	0.49	0.34
MILN	Global X Millennial Consumer ETF	11.5%	10.9%	0.28	0.32	0.32	0.36
PAVE	Global X U.S. Infrastructure Development ETF	11.3%	10.5%	0.15	0.16	0.17	0.19
EDOC	Global X Telemedicine & Digital Health ETF	11.1%	9.6%	0.38	0.49	0.53	0.52
DRIV	Global X Autonomous & Electric Vehicles ETF	11.0%	9.9%	0.12	0.13	0.14	0.15
BFIT	Global X Health & Wellness ETF	11.0%	10.9%	0.15	0.16	0.17	0.18
WNDY	Global X Wind Energy ETF	9.9%	18.9%	0.20	0.10	0.31	0.14
SNSR	Global X Internet of Things ETF	9.9%	8.8%	0.33	0.36	0.37	0.42
SPX	S&P 500 Index	9.5%	8.0%	0.32	0.39	0.35	0.42
ACWI	ACWI Index	9.4%	8.4%	0.23	0.27	0.27	0.31
HYDR	Global X Hydrogen ETF	8.8%	4.7%	0.96	2.04	0.92	2.27
AGNG	Global X Aging Population ETF	6.7%	7.8%	0.66	0.62	0.75	0.71
EDUT	Global X Education ETF	5.0%	16.7%	0.39	0.14	0.44	0.15
AQWA	Global X Clean Water ETF	4.9%	5.8%	0.57	0.49	0.77	0.66
CTEC	Global X Cleantech ETF	4.1%	2.7%	0.46	0.76	0.53	0.87
KROP	Global X AgTech & Food Innovation ETF	0.9%	6.0%	1.90	0.27	2.34	0.34

Note: F12 Sales Growth refers to the consensus analyst expectations for total sales growth in the next 12 months. PSG and EVSG refer to Price-to-Sales over F12 Sales Growth and Enterprise Value over F12 Sales Growth, respectively. N/A reflect a negative growth number in the denominator and similar to traditional PEG ratios aren't typically displayed as such (hence the N/A).

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- **Multi-Theme:** [Thematic Growth ETF \(GXTG\)](#), [China Innovation ETF \(KEJI\)](#)

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