

Artificial Intelligence

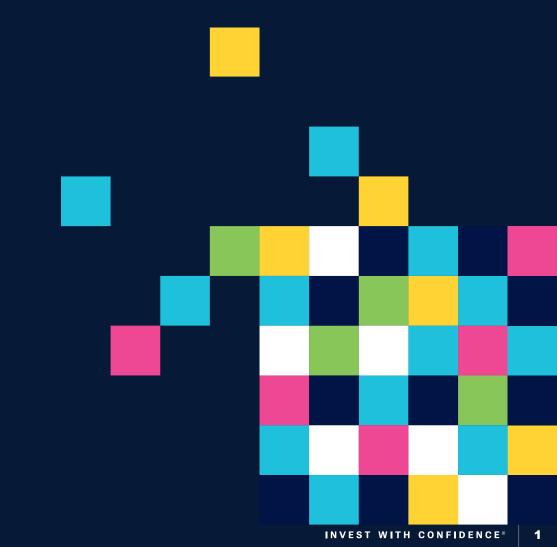
# Potentially the biggest technical innovation since electricity?

#### **Dom Rizzo**

Portfolio Manager September 2024



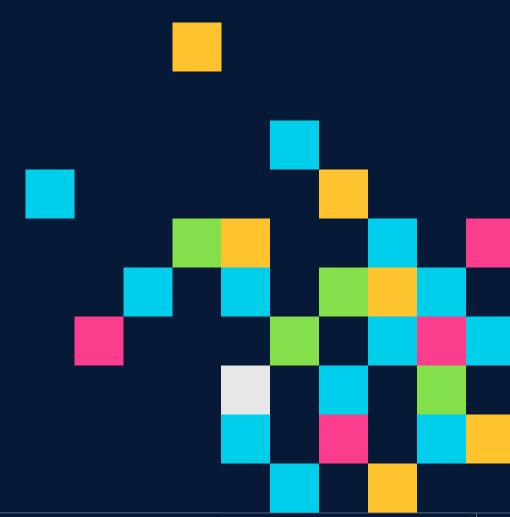
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# **Today's Speaker**



Dominic Rizzo, CFA
Portfolio Manager
Global Technology Equity Strategy



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# **Portfolio Manager**

T. Rowe Price Global Technology Equity Strategy

As of 31 August 2024



# Portfolio Manager **Dominic Rizzo, CFA**

- Nine years of investment experience
- With T. Rowe Price since 2015
  - Small-Cap Semiconductors Analyst (Baltimore)
  - European Technology Analyst (London)
  - International Structured Research Sleeve— Hardware/Software/Semis (London)
- London School of Economics—General Course
- M.B.A.—University of Chicago
- B.A.—Swarthmore College
- Chartered Financial Analyst®

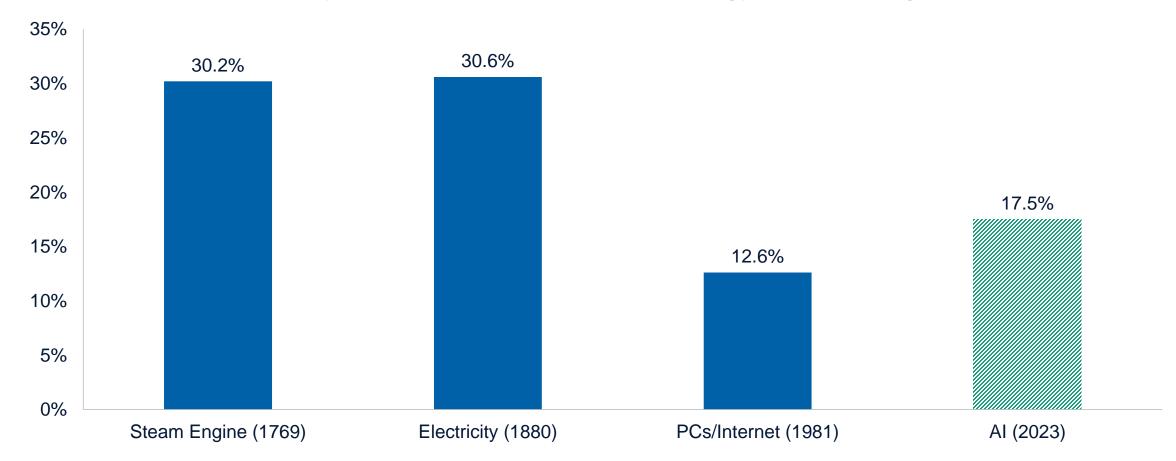
Manager	Dominic Rizzo
Strategy inception date	September 2000
Portfolio Manager inception date	December 2022
Benchmark	MSCI All Country World Technology Index
Strategy size	USD 9.4 billion <sup>1</sup>
Strategy launch date	September 2000
Typical Portfolio	30 to 80 stocks

<sup>&</sup>lt;sup>1</sup> As of 30 June 2024. CFA® and Chartered Financial Analyst® are registered trademarks owned by CFA Institute.

# Internet delivered a powerful productivity boost, but AI will likely surpass it

As of 31 August 2024

# Percent labor productivity upside relative to no technology breakthrough baseline

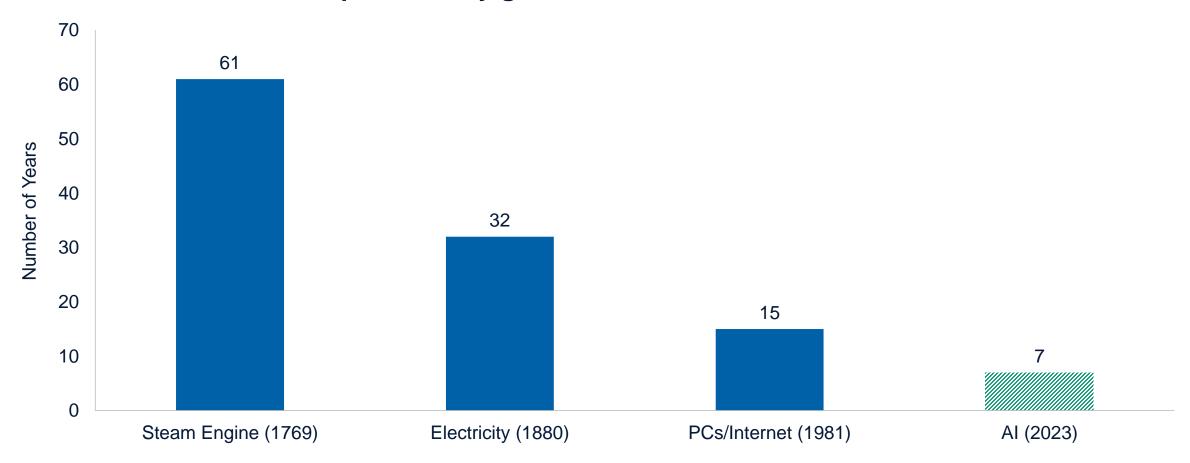


Source: Crafts (2021), NBER, BEA, Have, IMF, J.P. Morgan Private Bank. Data as of 31 December 2023.

# Timeline from innovation to productivity growth has been shrinking

As of 31 August 2024

## Years from innovation to productivity growth

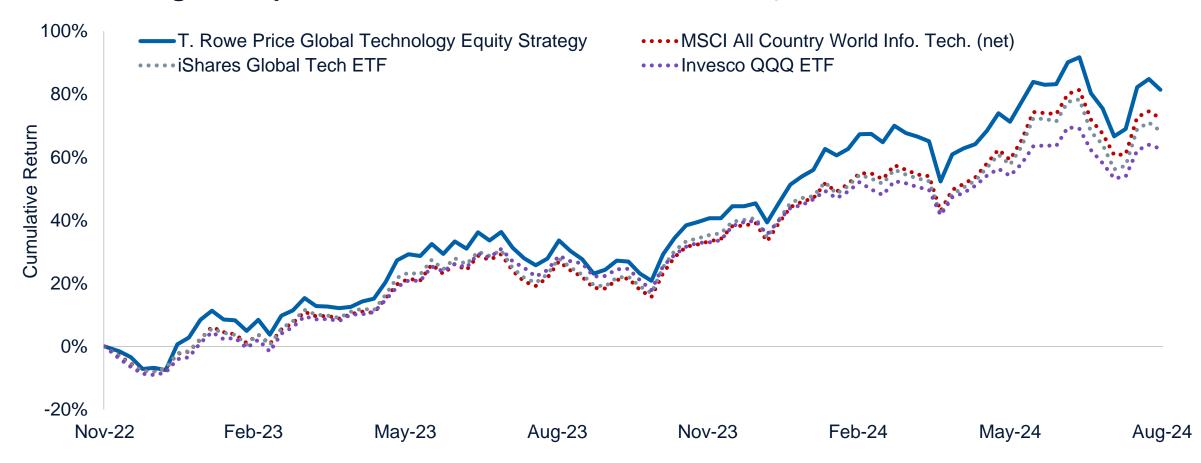


Source: Crafts (2021), NBER, BEA. Data as of 31 December 2023.

# **Navigating the Technology Landscape**

As of 31 August 2024

## Since Manager Inception Performance (1 December 2022 – 31 August 2024)



#### Past performance is not a reliable indicator of future performance.

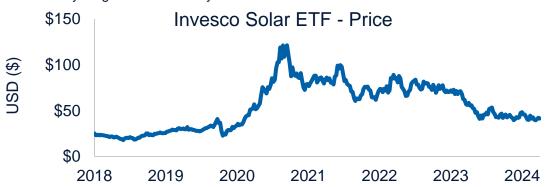
Source: T. Rowe Price, FactSet. Please see Additional Disclosures page for additional legal notices and disclaimers.

# Productivity Improvements Sometimes Lead to Speculative Bubbles

As of 31 August 2024

### Renewables—5x in 12 months

A "better way" to generate electricity



#### Electric Vehicles—300x in 30 months

A "better way" to transport people and goods



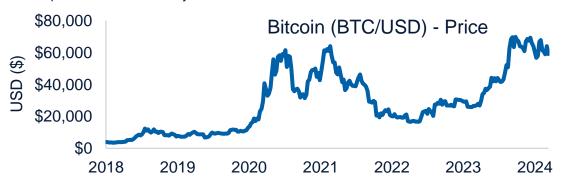
### China—5x in 20 months

Declining cost curve relative to rest-of-world



## Bitcoin—20x in 24 months

A "cheaper and frictionless way to transact"



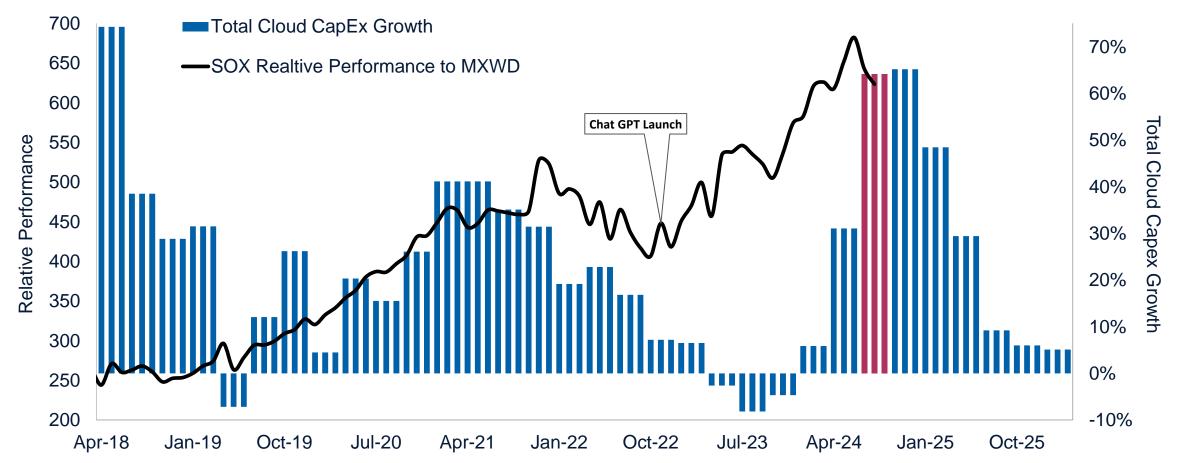
#### Past performance is not a reliable indicator of future performance.

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# We may be at peak year-over-year growth in cloud capital expenditures

As of 31 August 2024

## **SOX Relative Performance vs. Total Cloud CapEx**



#### Past performance is not a reliable indicator of future performance.

Source: T. Rowe Price.

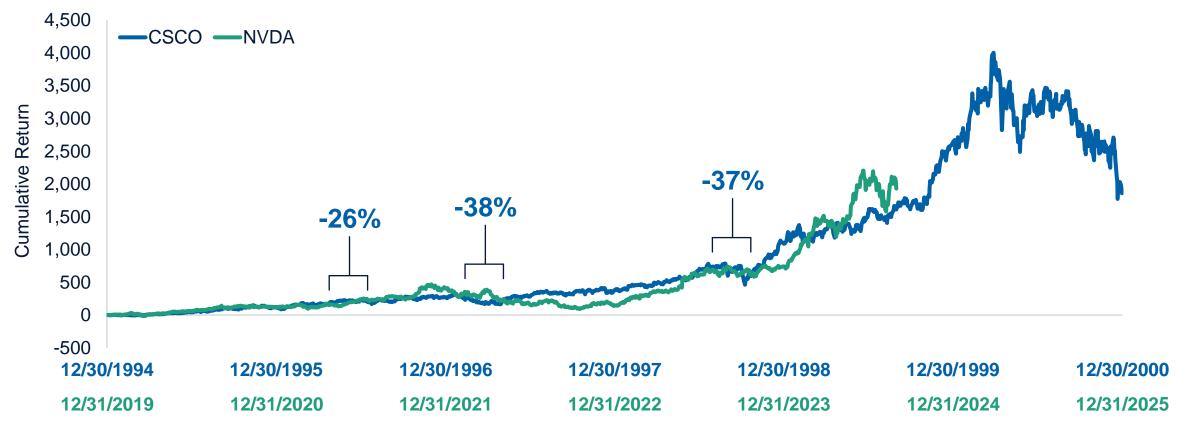
<sup>\*</sup>To read these charts, the dark blue bars are quarterly y/y growth rates (the light blue bars are 2Q24E) and the black line is relative performance (or absolute/relative NTM multiples). These are all compared versus the S&P500. Estimates are not quarantees of future performance.

# **Continued Strength Through Corrections**

As of 31 August 2024

#### **Dot-com era Cisco and Al-Nvidia resilience**

Cisco: 31 December 1994–31 December 2000; Nvidia: 31 December 2019–31 December 2025

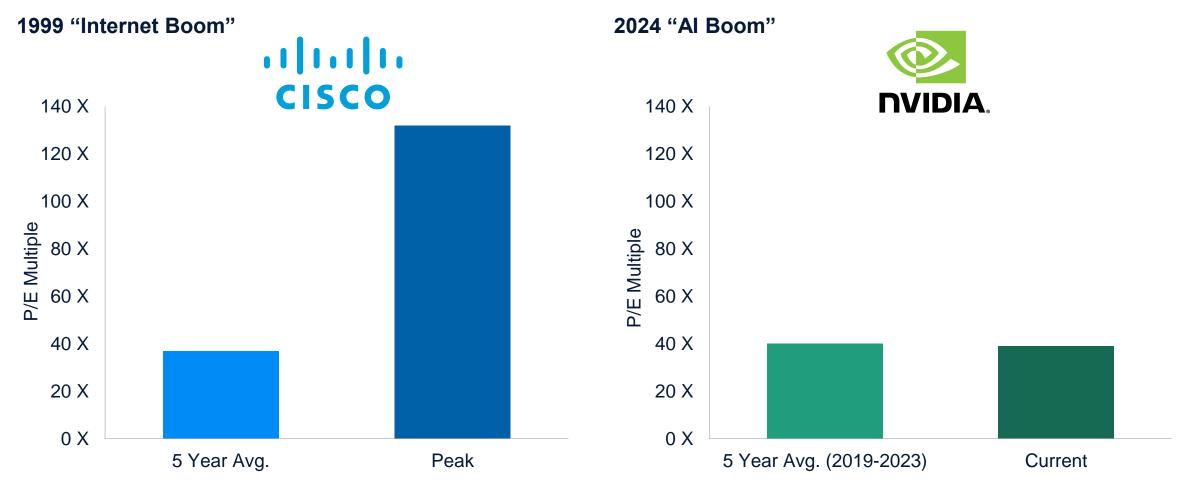


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# Al is not a valuation bubble like the dot-com era...

## **Comparing Price-to-Earnings Growth**



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# **Mega-cap Growth valuation in context**

As of 31 August 2024

3.2		S	ize	Valuation				
		Market weight	Market Cap (\$ Bn)	*24m fwd P/E	24m fwd EV/Sales			
Big	Apple	7.0%	3,482	30.7	8.4			
	Microsoft	6.5%	3,101	27.1	9.8			
	NVIDIA	6.2%	2,928	29.8	16.4			
	Alphabet	3.7%	1,897	19.0	5.1			
Tech	Amazon	3.5%	1,872	30.5	2.7			
	Meta Platforms	2.4%	1,139	21.5	7.1			
	Tesla	1.3%	684	67.5	5.7			
	Big Tech Aggregate	30.5%	\$15,086	32.3	7.9			
	Microsoft	4.5%	581	53.2	19.2			
	Cisco Systems	4.2%	543	101.7	17.5			
	Intel	3.6%	465	42.1	11.5			
Tech	Oracle	1.9%	245	84.6	19.0			
Bubble	IBM	1.7%	218	23.5	2.3			
	Lucent	1.6%	206	37.9	4.1			
	Nortel Networks	1.5%	199	86.4	6.4			
	Tech Bubble Aggregate	19.0%	\$2,457	52.0	8.2			
	IBM	7.1%	48	35.5				
	Eastman Kodak	3.6%	24	43.5				
	Sears Roebuck	2.7%	18	29.2				
Nifty	General Electric	2.0%	13	23.4				
50	Xerox	1.8%	12	45.8				
	3M	1.4%	10	39.0				
	Procter & Gamble	1.4%	9	29.8				
	Nifty 50 Aggregate	19.9%	\$135	34.3				

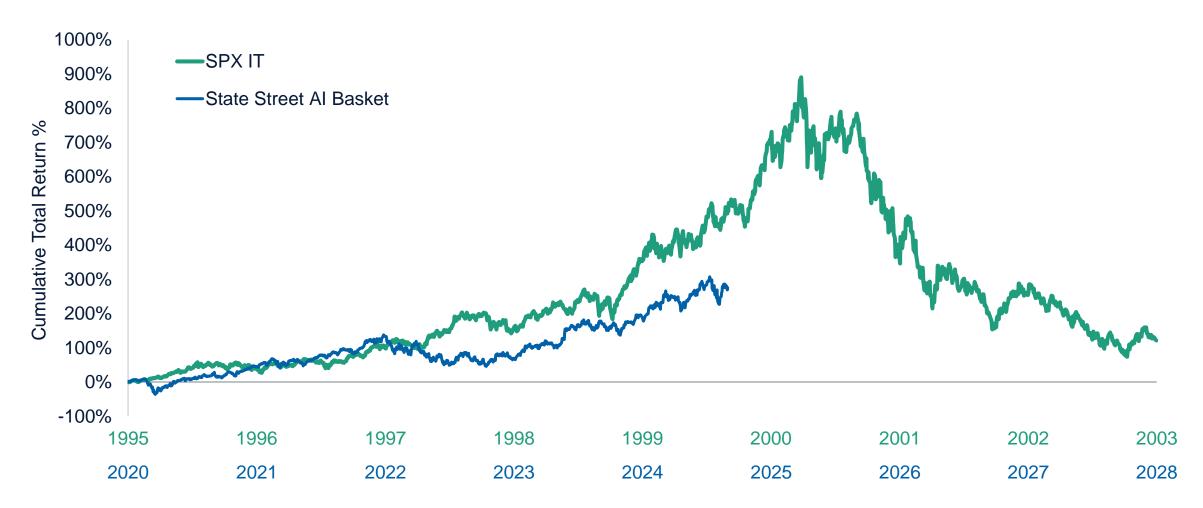
Source: Datastream, Factset, Goldman Sachs Global Investment Research.

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# Al versus the Internet

As of 31 August 2024



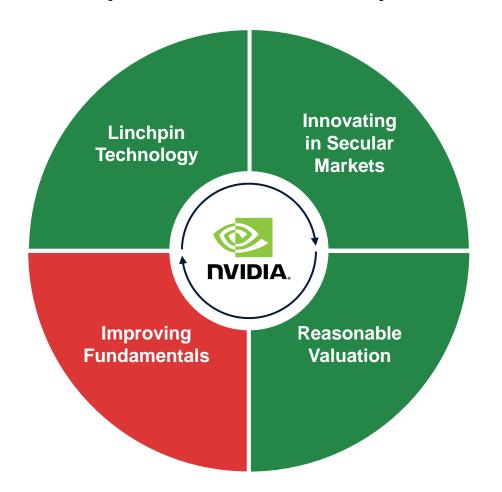
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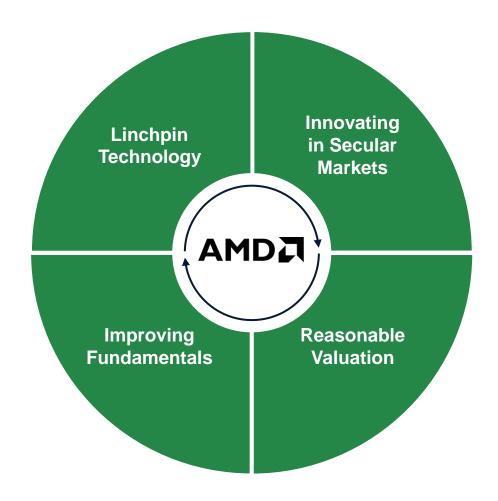
Source: Historical fund data, Standard & Poor's and State Street. Please see Additional Disclosures page for additional legal notices and disclaimers.

Securities in the State Street Al Basket include: TWLO, SNPS, RMBS, PSTG, ONTO, ON, NVDA, NTNX, MRVL, JNPR, JBL, IT, GDDY, FTNT, FFIV, DXC, CRM, AVGO, ANET, AMD, ACN, ACLS, WDAY.

# Fitting the Framework

# How two Al powerhouses stack up





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# Areas We See Opportunities Outside of Artificial Intelligence

#### Cybersecurity

As threats continue to increase, we see a consolidation of cybersecurity vendors who can deal with a more dangerous world.



#### **Enterprise Software**

Anticipate data infrastructure companies, vertical application vendors, and cybersecurity vendors to capitalize on the advancements in AI.



# E-commerce, Digital Advertising and FinTech

Digital commerce penetration and FinTech utilization normalizing post COVID. Digital advertising benefiting from advancements in AI/ML.



# **Emerging Markets**

Emerging markets provide select opportunities in e-commerce, IT consulting, software, and FinTech.



# **Global Technology Investment Team**

As of 31 August 2024

Name	Area of Expertise	Years with T. Rowe Price	Years of Investment Experience
Dominic Rizzo, CFA	Portfolio Manager – Global Technology Strategy	8	8
Tony Wang	Portfolio Manager – Science & Technology Strategy	6	9
Jim Stillwagon	Portfolio Manager – Communications & Technology Strategy	6	15
Ken Allen	U.S. Software	23	23
Ross MacMillan	U.S. Software	4	26
Nic Edwards	SMID U.S. Software	5	5
Daniel Shear, CFA	U.S. Media & Telecom	3	6
Chris Graff	U.S. Internet, Media, and Video Games	3	11
Grant Yuan	U.S. Media & Internet	7	7
Stephanie Beebe	U.S. Software, Hardware, and Semiconductors	3	3
Anna Nussbaum	U.S. Semiconductors & Semiconductor Equipment	3	7
Lee Sandquist	U.S. Electric Vehicles	1	9
Ari Weisband, CFA	U.S. Financials & Business Services	8	8
Shaun Currie	Business Services	7	7

Name	Area of Expertise	Years with T. Rowe Price	Years of Investment Experience
Malik Asif	European Technology	11	16
Sin Dee Tan, CFA	Europe Small-Cap Generalist	15	15
Paulina Amieva	Latin America Retail & Payments	15	17
Frank Shi	Asia Hardware	4	11
Jacqueline Liu	Asia Internet	9	17
Bill Bai	Asia Internet	4	15
Dennis Hou	Asia Electric Vehicles	1	1
Aden Lau	Asia Ex-Japan Technology	11	15
Andrew Chang	Japan Industrials	8	17
Li Jin	Japan Technology	1	9

Extensive collaboration among investment professionals enhances idea generation.

# **Performance**

## Global Technology Equity Composite

Figures are Calculated in US Dollars

Calendar Years	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023 <sup>2</sup>
Global Technology Equity Composite (Gross of Fees)	25.00%	22.01%	7.49%	48.30%	-8.85%	35.14%	76.53%	9.72%	-55.43%	59.63%
Global Technology Equity Composite (Net of Fees)	24.15	21.17	6.74	47.30	-9.49	34.22	75.35	8.96	-55.76	58.55
MSCI All Country World Index Information Technology§*	15.73	3.64	12.71	42.27	-5.47	47.52	46.13	27.69	-30.86	51.45
Value Added (Gross of Fees)*	9.27	18.37	-5.22	6.03	-3.38	-12.38	30.40	-17.97	-24.57	8.18
Value Added (Net of Fees)*	8.42	17.53	-5.97	5.03	-4.02	-13.30	29.22	-18.73	-24.90	7.10
MSCI All Country World Index Information Technology Net <sup>△Y</sup>	15.20	3.20	12.20	41.77	-5.81	46.89	45.61	27.36	-31.07	51.02
Value Added (Gross of Fees)*	9.80	18.81	-4.71	6.53	-3.04	-11.75	30.92	-17.64	-24.36	8.61
Value Added (Net of Fees)*	8.95	17.97	-5.46	5.53	-3.68	-12.67	29.74	-18.40	-24.69	7.53

#### Past performance is not a reliable indicator of future performance.

Gross performance returns are presented before management and all other fees, where applicable, but after trading expenses. Net of fees performance reflects the deduction of the highest applicable management fee that would be charged based on the fee schedule, without the benefit of breakpoints. Gross and net performance returns reflect the reinvestment of dividends and are net of all non-reclaimable withholding taxes on dividends, interest income, and capital gains. § Index returns shown with gross dividends reinvested.

 $<sup>\</sup>Delta$  Index returns shown with reinvestment of dividends after the deduction of withholding taxes.

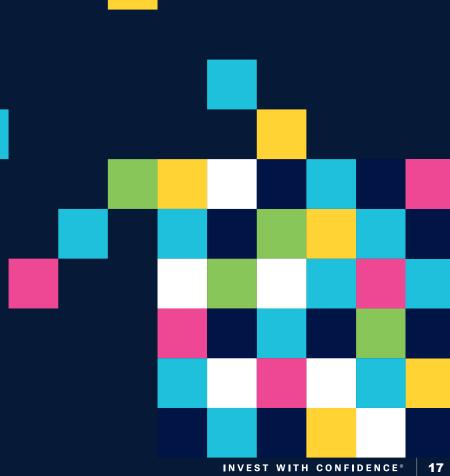
<sup>\*</sup> The Value Added row is shown as Global Technology Equity Composite minus the benchmark in the previous row.

<sup>€</sup> Investors should note that the composite's short-term performance is highly unusual and unlikely to be sustained.

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# Fee Schedule Global Technology Equity Composite

As of 30 June 2024

The Global Technology Equity Composite seeks long-term capital appreciation through investments in companies around the world expected to benefit from technological progress. (Created June 2006; incepted October 31, 2000)

First 50 million (USD)	70 basis points
Next 50 million (USD)	67.5 basis points
Above 100 million (USD)	65 basis points on all assets1
Above 200 million (USD)	62.5 basis points on all assets1
Minimum separate account size	50 million (USD)

<sup>&</sup>lt;sup>1</sup> A transitional credit is applied to the fee schedule as assets approach or fall below the breakpoint. Extended breakpoints may be available for higher asset levels.

# GIPS® Composite Report Global Technology Equity Composite

Period Ended 31 December 2023 Figures Shown in U.S. Dollar

	<u>2014</u>	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022</u>	<u>2023</u>
Gross Annual Returns (%)	25.00	22.01	7.49	48.30	-8.85	35.14	76.53	9.72	-55.43	59.63
Net Annual Returns (%) <sup>1</sup>	23.81	20.84	6.44	46.90	-9.75	33.85	74.88	8.66	-55.89	58.12
MSCI All Country World Index Information Technology (%) <sup>2</sup>	15.73	3.64	12.71	42.47	-5.47	47.52	46.13	27.69	-30.86	51.45
MSCI All Country World Index Information Technology (%) Net	15.20	3.20	12.20	41.77	-5.81	46.89	45.61	27.36	-31.07	51.02
Composite 3-Yr St. Dev.	14.51	13.49	15.99	15.79	18.10	19.11	23.81	22.62	29.63	28.81
MSCI All Country World Index Information Technology 3-Yr St. Dev.	11.33	11.21	13.34	13.68	14.52	15.11	20.77	18.66	24.40	22.64
MSCI All Country World Index Information Technology Net 3-Yr St. Dev.	11.32	11.19	13.32	13.68	14.51	15.11	20.78	18.67	24.39	22.63
Composite Dispersion	N/A	N/A	N/A	N/A	0.24	N/A	N/A	N/A	N/A	N/A
Comp. Assets (Millions)	1,837.4	3,042.9	3,720.7	8,173.1	7,087.4	7,350.1	13,531.5	14,941.4	4,616.7	6,589.1
# of Accts. in Comp.	2	3	5	6	7	6	6	6	6	6
Total Firm Assets (Billions)	749.6	772.4	817.2	1,000.2	972.7	1,218.2	1,482.5	1,653.6	1,237.4	1,403.83

<sup>1</sup> The fee rate used to calculate net returns is 0.98%. This represents the maximum fee rate applicable to all composite members. Past performance is not a reliable indicator of future performance.

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Gross performance returns are presented before management and all other fees, where applicable, but after trading expenses. Net of fees performance reflects the deduction of the maximum fee rate applicable to all composite members as shown above. Gross performance returns reflect the reinvestment of dividends and are net of nonreclaimable withholding taxes on dividends, interest income, and capital gains. Gross performance returns are used to calculate presented risk measures. Effective June 30, 2013, portfolio valuation and assets under management are calculated based on the closing price of the security in its respective market. Previously portfolios holding international securities may have been adjusted for after-market events. Policies for valuing portfolios, calculating performance, and preparing compliant presentations are available upon request. Dispersion is measured by the standard deviation across asset-weighted portfolio returns represented within a composite for the full year. Dispersion is not calculated for the composites in which there are five or fewer portfolios.

Some portfolios may trade futures, options, and other potentially high-risk derivatives that may create leverage and generally represent in aggregate less than 10% of a portfolio.

Benchmarks are taken from published sources and may have different calculation methodologies, pricing times, and foreign exchange sources from the composite.

Composite policy requires the temporary removal of any portfolio incurring a client initiated significant cash inflow or outflow greater than or equal to 15% of portfolio assets. The temporary removal of such an account occurs at the beginning of the measurement period in which the significant cash flow occurs and the account re-enters the composite on the last day of the current month after the cash flow. Additional information regarding the treatment of significant cash flows is available upon request.

The firm's list of composite descriptions, a list of limited distribution pooled fund descriptions, and a list of broad distribution pooled funds are available upon request. GIPS® is a registered trademark of CFA Institute. CFA Institute does not endorse or promote this organization, nor does it warrant the accuracy or quality of the content contained herein.

<sup>&</sup>lt;sup>2</sup> Effective July 1, 2018, MSCI All Country World Index Information Technology Net Index was added as a secondary benchmark.

<sup>&</sup>lt;sup>3</sup> Preliminary - subject to adjustment.

# Objective and Risks Global Technology Equity Composite

#### **Objective**

The Global Technology Equity Composite seeks long term capital appreciation through investments in companies around the world expected to benefit from technological progress.

#### Risks – the following risks are materially relevant to the portfolio:

Country (China) - Chinese investments may be subject to higher levels of risks such as liquidity, currency, regulatory and legal risks due to the structure of the local market.

**Issuer concentration** – Issuer concentration risk may result in performance being more strongly affected by any business, industry, economic, financial or market conditions affecting those issuers in which the portfolio's assets are concentrated.

**Sector concentration** – Sector concentration risk may result in performance being more strongly affected by any business, industry, economic, financial or market conditions affecting a particular sector in which the portfolio's assets are concentrated.

Small and mid-cap – Small and mid-size company stock prices can be more volatile than stock prices of larger companies.

Style – Style risk may impact performance as different investment styles go in and out of favor depending on market conditions and investor sentiment.

**Currency** – Currency exchange rate movements could reduce investment gains or increase investment losses.

Emerging markets – Emerging markets are less established than developed markets and therefore involve higher risks.

#### **General Portfolio Risks**

Capital risk – the value of your investment will vary and is not guaranteed. It will be affected by changes in the exchange rate between the base currency of the portfolio and the currency in which you subscribed, if different.

Equity risk – in general, equities involve higher risks than bonds or money market instruments.

**Geographic concentration risk** – to the extent that a portfolio invests a large portion of its assets in a particular geographic area, its performance will be more strongly affected by events within that area.

Hedging risk – a portfolio's attempts to reduce or eliminate certain risks through hedging may not work as intended.

Investment portfolio risk – investing in portfolios involves certain risks an investor would not face if investing in markets directly.

**Management risk** – the investment manager or its designees may at times find their obligations to a portfolio to be in conflict with their obligations to other investment portfolios they manage (although in such cases, all portfolios will be dealt with equitably).

Operational risk – operational failures could lead to disruptions of portfolio operations or financial losses.

# **Additional Disclosures**

Unless otherwise noted, the information provided in this material does not include content relating to Oak Hill Advisors, L.P., an alternative credit manager, which T. Rowe Price Group, Inc. acquired on 29 December 2021.

Unless otherwise noted, numbers may not total due to rounding.

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# Thank You

