

U.S. Technology Sector
**Magnitude Of
Cyclical Rebound
Is Key To Watch**

David Tsui, CFA, CPA

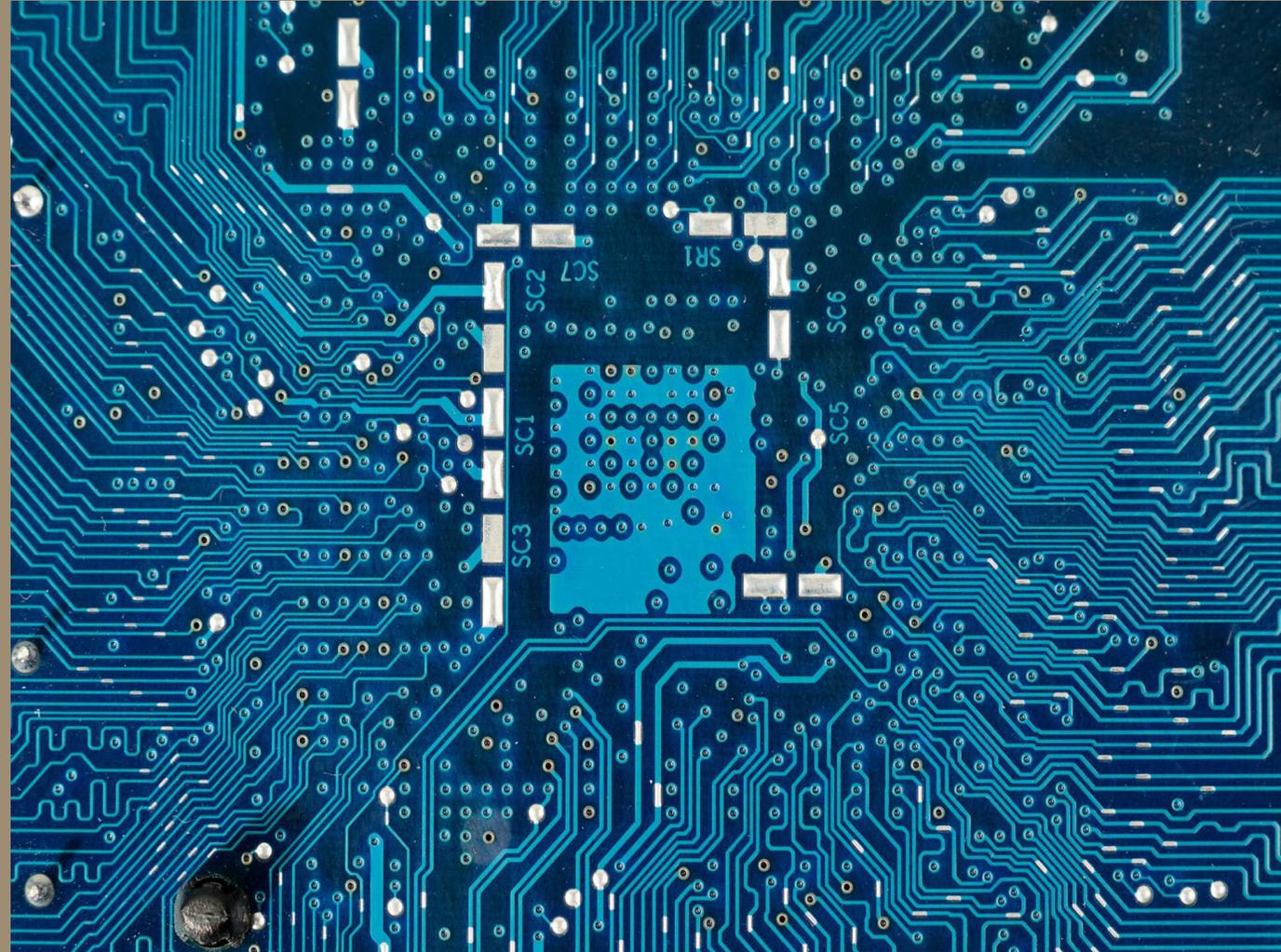
Andrew Chang

Chris Frank

James Thomas

Tuan Duong

January 2024



Top Technology Industry Themes For 2024

IT spending growth fueled by AI demand and cyclical recovery

Key Assumptions



IT spending will rebound in 2024, above global GDP growth as the risk of a hard landing fades and product sales of most hardware products experience a cyclical recovery.



After falling 10% in 2023, **the semiconductor industry** is poised for a strong rebound in 2024 as memory fundamentals improve.

Key Risks or Opportunities



Supply chain diversification may lead to cost inflation and will be a multiyear process.



As **interest rates remain elevated**, the trajectory of borrowing costs and business conditions remain key focus areas for issuers rated 'B-' or lower.



There is pent-up demand for **mergers and acquisitions** after two quiet years.

(%)	2021	2022	2023 estimate	2024 estimate
Global IT spending	13.7	6.1	3.9	7.9
Revenues				
IT services	13	6	6	7
Software	15	9	12	11
Semiconductors	26	3	(10)	14
Network equipment	2	5	7	(3)
Mobile telecom equipment	12	5	(3)	(2)
External storage	6	7	(2)	5
Shipments				
PC	15	(16)	(1%)	4
Smartphone	4	(11)	(4)	3
Server	6	5	(7)	6
Printer	(3)	(3)	(3)	(3)

Source: S&P Global Ratings | "Industry Credit Outlook 2024: Technology" Jan 9, 2024.

2024 Resiliency Will Be Tested Before A Macro Recovery in 2025

U.S.

- High inflation continues to ease, with core inflation falling closer to the Fed's 2% target by mid-2024.
- Higher costs of capital will lower capex and hiring. The unemployment rate will likely rise in the next two years above the longer-run steady state.
- Expect cuts to start in mid-2024.

Eurozone

- As real incomes set to rise, resilient labor markets and disinflation could lead the European economy to a soft landing.
- Strong momentum in services is abating, while the end of the manufacturing recession might be in sight.

China

- Pressure on consumer inflation may not dissipate soon.
- Emphasis on manufacturing investment rather than consumption is raising the risk of deflation. More 'rebalanced' growth implies less pressure on prices and margins.

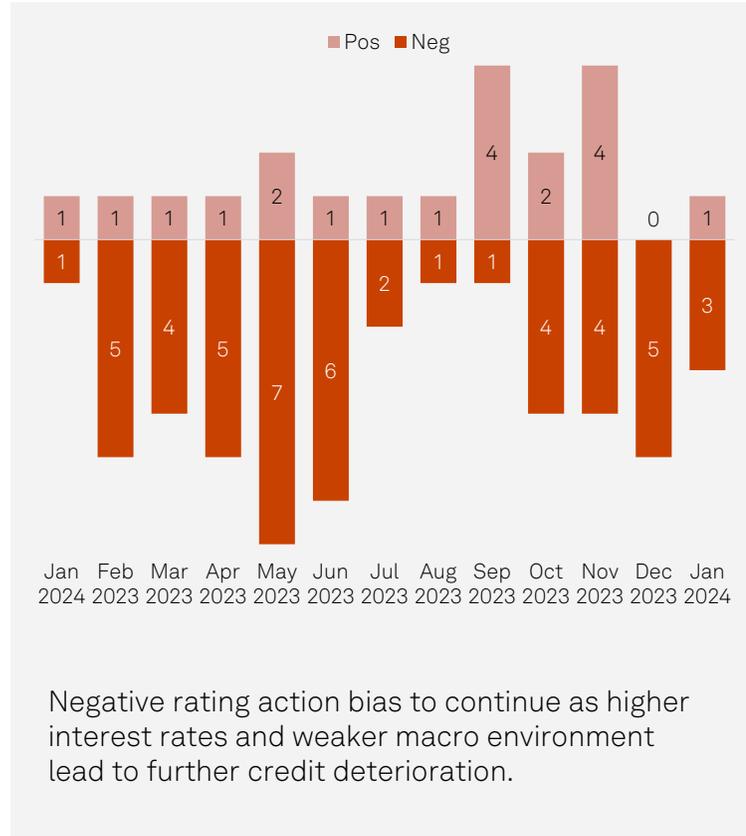
Real GDP growth forecasts (%)

	2022	2023 estimate	2024 estimate
World	3.6	3.3	2.8
U.S.	1.9	2.4	1.5
Eurozone	3.5	0.6	0.8
China	3.0	5.4	4.6

Capex--Capital expenditure. Source: S&P Global Ratings.

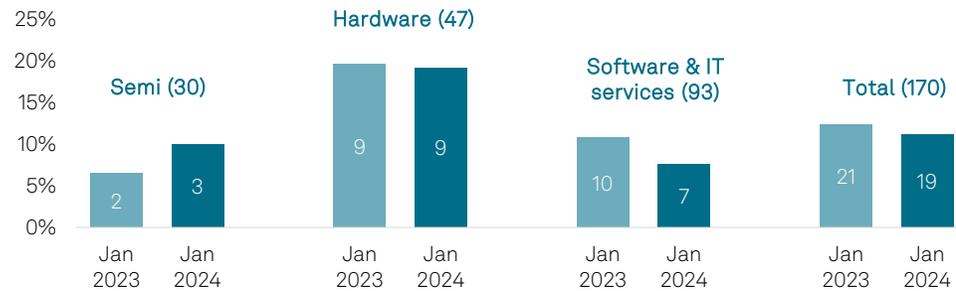
U.S. Tech Issuers Ratings Trends

Positive vs. negative rating actions (no.)

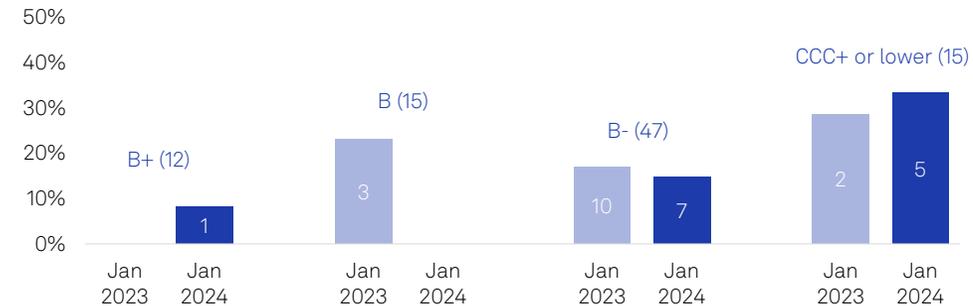


Negative year-over-year outlook bias (%)
Subsector and category (total issuer count)

By sector



By rating



Many PE-owned software issuers hurt by significant rise in interest rates

Hardware companies hurt by cash flow volatility and limited revenue visibility

Resilience of U.S. economy and recession risk have not materially diminished negative rating pressure of lower-rated issuers given still-elevated interest rates.

Negative outlook bias indicates percentage of total issuers with rating on negative outlook or CreditWatch negative. PE--Private equity. Source: S&P Global Ratings.

Rating Activities On U.S. Tech Issuers Since July 2023

Positive Negative

Date	Issue name	Current rating	Previous rating
Hardware			
07/06/23	Casa Systems Inc.	CCC+/Stable/--	CCC/Watch Dev/--
09/01/23	NCR Corp.	B+/Stable/--	B+/Watch Dev/--
09/18/23	CommScope Holding Co. Inc.	B-/Negative/--	B-/Stable/--
10/09/23	Xerox Holdings Corporation	BB/Stable/--	BB/Negative/--
10/31/23	CommScope Holding Co. Inc.	B-/WatchNeg/--	B-/Negative/--
10/31/23	Western Digital Corp.	BB/WatchNeg/--	BB/Negative/--
11/02/23	Emerald Technologies Acq. Co.	B-/Negative/--	B-/Stable/--
11/20/23	CommScope Holding Co. Inc.	CCC/Negative/--	B-/WatchNeg/--
11/22/23	Avaya Holdings Corp.	CCC+/Stable/--	D/--/--
12/04/23	Pitney Bowes Inc.	B+/Stable/--	BB-/Stable/--
12/07/23	Viavi Solutions Inc.	BB/Stable/--	BB+/Negative/--
12/21/23	Electronics for Imaging Inc.	CCC+/Negative/--	B-/Negative/--
01/11/24	Hewlett Packard Enterprise Co.	BBB/Negative/A-2	BBB/Stable/A-2
01/12/24	Juniper Networks Inc.	BBB/Negative/--	BBB/Stable/--
Semi			
07/31/23	Lumentum Holdings Inc.	B+/Negative/--	BB-/Stable/--
10/02/23	Coherent Corp.	BB-/Negative/--	BB-/Stable/--
11/06/23	MaxLinear Inc.	BB-/Stable/--	BB/WatchNeg/--
11/28/23	Broadcom Inc.	BBB/Stable/A-2	BBB-/Watch Pos/A-3

Date	Issue name	Current rating	Previous rating
Software and Services			
07/12/23	Project Alpha Intermediate Holding Inc.	B-/Stable/--	B/Watch Neg/--
08/01/23	Imperva Inc.	CCC+/Watch Pos/--	CCC+/Stable/--
08/02/23	Hyland Software Inc.	B-/Negative/--	B-/Stable/--
08/17/23	Panther Guarantor II L.P.	B-/Watch Dev/--	B-/Stable/--
09/18/23	Banff Parent Inc.	B-/Positive/--	B-/Stable/--
09/22/23	Uber Technologies Inc.	BB-/Positive/--	B+/Positive/--
09/25/23	Red IntermediateCo LLC	B-/Stable/--	B-/Negative/--
09/26/23	Genesys Cloud Services Holdings II LLC	B/Stable/--	B-/Stable/--
10/05/23	Project Alpha Intermediate Holding Inc.	B-/WatchPos/--	B-/Stable/--
10/17/23	Atlas Midco Inc.	CCC+/Stable/--	B-/Stable/--
11/02/23	Project Alpha Intermediate Holding Inc.	B/Stable/--	B-/Watch Pos/-
11/21/23	Tenable Holdings Inc.	BB-/Stable/--	B+/Stable/--
11/30/23	Veritas Holdings Ltd.	CCC+/Negative/--	B-/Negative/--
12/12/23	Astra Acquisition Corp.	CCC/Negative/--	CCC+/Negative/-
12/15/23	Magenta Buyer LLC	CCC+/Stable/--	B-/Negative/--
01/12/24	GoTo Group Inc.	CCC+/Negative/--	B-/Negative/--
01/22/24	UKG Inc.	B-/Stable/--	B-/Negative/--

As of Jan 31, 2024. Source: S&P Global Ratings.

Rating Activities On Select U.S. Tech Issuers

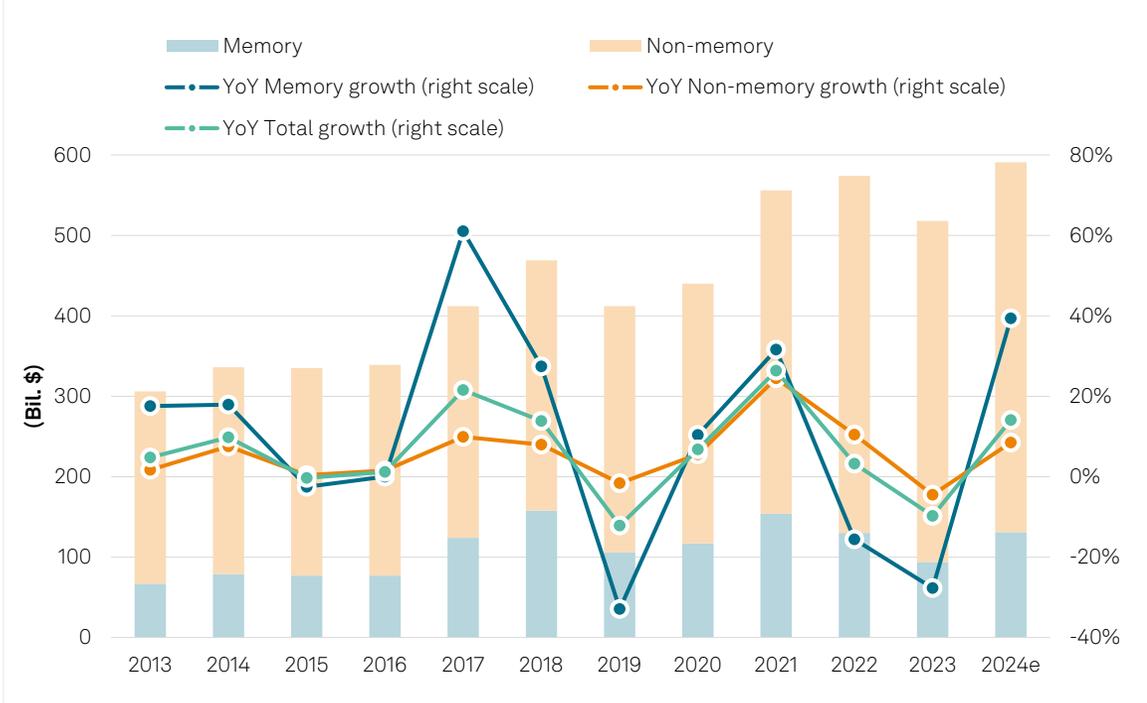
Upgrade Downgrade

Subsector	2017	2018	2019	2020	2021	2022	2023	2024
Hardware								
Juniper Networks Inc.	BBB							
HP Inc.	BBB							
Hewlett Packard Enterprise Co.	BBB							
Dell Technologies Inc.	BB+	BB+	BB+	BB+	BBB	BBB	BBB	BBB
Xerox Holdings Corp.	BBB-	BB+	BB+	BB	BB	BB	BB	BB
Western Digital Corp.	BB+	BB+	BB+	BB+	BB+	BB	BB	BB
Pitney Bowes Inc.	BBB-	BB+	BB+	BB+	BB	BB	B+	B+
NCR Voyix Corp.	BB+	BB+	BB	BB-	BB-	B+	B+	B+
Semiconductor								
NVIDIA Corp.	BBB+	BBB+	A-	A-	A-	A	A+	A+
Intel Corp.	A+	A+	A+	A+	A+	A+	A	A
Qualcomm Inc.	A	A-	A-	A-	A	A	A	A
Applied Materials Inc.	A-	A-	A-	A-	A	A	A	A
Analog Devices Inc.	BBB	BBB	BBB	BBB	A-	A-	A-	A-
Lam Research Corp.	BBB+	BBB+	BBB+	A-	A-	A-	A-	A-
Advanced Micro Devices Inc.	B-	B+	BB-	BB+	BBB-	A-	A-	A-
KLA Corp.	BBB	BBB	BBB	BBB+	BBB+	A-	A-	A-
NXP Semiconductors N.V.	BBB-	BBB-	BBB-	BBB	BBB	BBB	BBB+	BBB+
Qorvo Inc.	BB+	BB+	BB+	BB+	BBB-	BBB-	BBB-	BBB-
Skyworks Solutions Inc.					BBB-	BBB-	BBB-	BBB-
Services								
IBM Corp.	A+	A	A	A	A-	A-	A-	A-
Software								
Salesforce.com Inc.	N/R	A-	A	A	A+	A+	A+	A+
Adobe Inc.	A	A	A	A	A+	A+	A+	A+
ServiceNow Inc.	N/R	N/R	N/R	BBB+	A-	A-	A-	A-
Intuit Inc.	A-							
Autodesk Inc.	BBB	BBB	BBB	BBB	BBB	BBB+	BBB+	BBB+
Oracle Corp.	AA-	AA-	A+	A	BBB+	BBB	BBB	BBB

As of Jan 31, 2024. N/R--Not rated. Source: S&P Global Ratings.

Semi Revenue To Recover In 2024 Led By Memory Bounce Back

Semiconductor industry revenue by segment



- Semiconductor revenue trajectory is highly dependent on global macro factors
- Slower end demand recovery means more drawn-out inventory correction
- Increasing attention to geopolitics: chip ban, Taiwan/China conflict

YoY--Year over year. e--Estimate.

Source: S&P Global Ratings | "Industry Top Trends 2023: Technology" Jan. 9, 2024

Memory

- Maintaining production cuts critical for recovery
- Do not expect midcycle margins until 2025

Micron Technology Inc.
Samsung Electronics Co. Ltd.
SK Hynix Inc.
Western Digital Corp.

Non-memory

- AI becoming prominent growth driver for many
- Taiwan Semiconductor Manufacturing Co. Ltd. signaling good growth ahead for fabless companies

Analog Devices Inc.
Intel Corp.
NVIDIA Corp.
NXP Semiconductors N.V.
Texas Instruments Inc.

Wafer fab equipment (WFE)

- Largest semi cap equipment vendor have increasing revenue exposure to China (>25%) over the years
- Long-term capital intensity and demand trends favorable

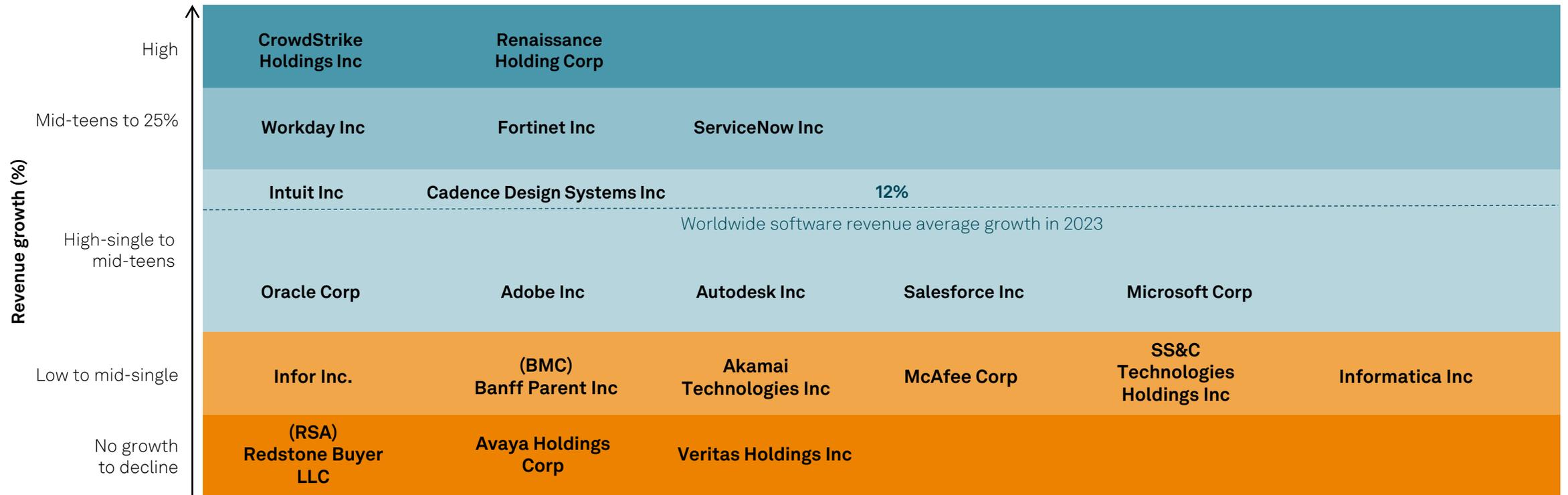
Applied Materials Inc.
ASML Holding N.V.
Lam Research Corp.
KLA Corp.
Entegris Inc.
MKS Instruments Inc.

Biden Administration Increasing Scrutiny On Chip Export To China

Geopolitics	ESG	Taxes	Big tech regulation
<p> U.S. views certain Chinese tech firms as national security risks.</p> <p> CHIPs Act helps fund domestic manufacturing and provides support for R&D spending.</p> <p> U.S. government bans export of leading-edge AI chips to China.</p> <p> New U.S. order prohibits new PE, VC, JV investment in Chinese companies working in advanced semi & quantum computers, starting 2024.</p>	<p> High awareness of ESG concerns by tech firms.</p> <p> Tech-enabled clean energy & infrastructure investment already providing boost to semiconductor industry.</p> <p> Emissions and waste reduction will add to cost base.</p>	<p> Inflation Reduction Act will increase corporate taxes for some tech companies.</p> <p> Phase-out of 2017 Tax Cuts & Jobs Act (TCJA) R&D and interest deductibility.</p> <p> Higher taxes and TCJA phase-outs will hurt bottom lines and cash flows, but we expect limited credit impact for most as companies mitigate effect via tax planning.</p>	<p> Breakup of big tech is low-probability event.</p> <p> Regulatory scrutiny discourages large-scale M&A.</p> <p> Big tech to be resourceful in remediating possible new legislation; likely involve tweaks to business models rather than break-ups.</p> <ul style="list-style-type: none">• Alphabet Inc.• Amazon.com Inc.• Apple Inc.• Meta Platforms Inc.

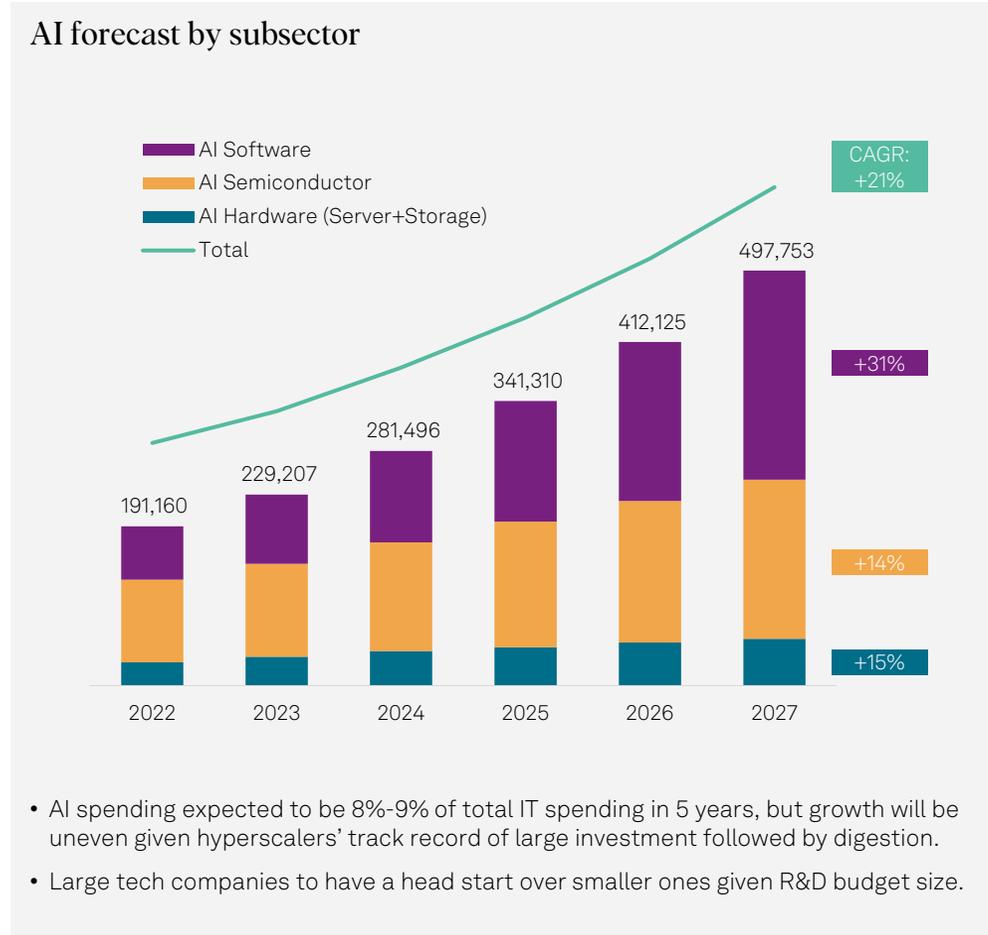
R&D--Research and development. VC--Venture capital. JV--Joint venture. ESG--Environmental, social, and governance. Source: S&P Global Ratings.

Largest Tech Issuers Growing Near Software Industry Average Of 12%



Source: S&P Global Ratings.

Early Innings In AI Investment Cycle

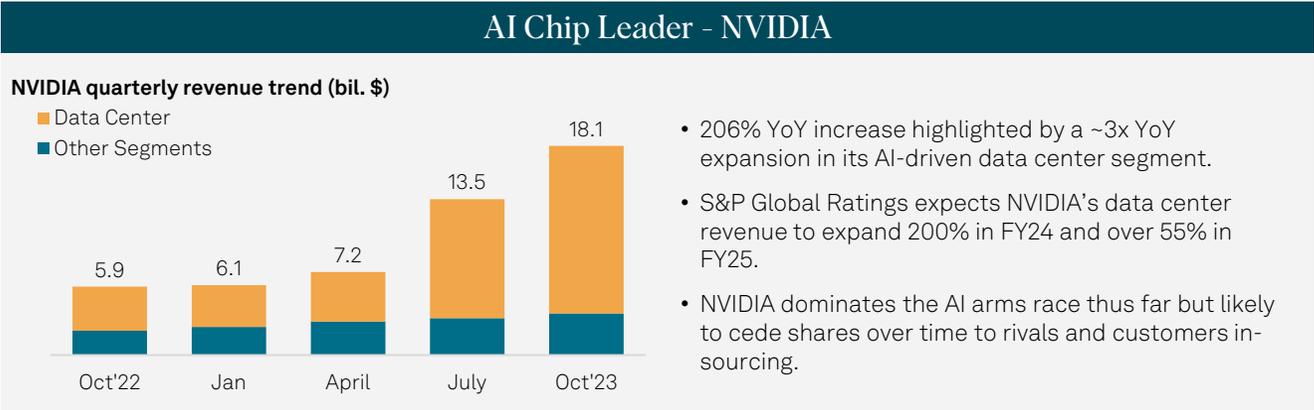


“AI accelerated market would grow ~50% annually over the next few years, from about \$30B in 2023 to more than \$150B in 2027.”
-- AMD

“CAGR for the next 5 years... to be over 40% annually for AI servers... And for the HBM market, the current projection is 60% to 80% growth.”
-- SK Hynix

“Today, server AI processor demand... accounts for ~6% of TSMC's total revenue. We forecasted this to grow at close to 50% CAGR in the next 5 years and increase to low teens % of our revenue.”
-- TSMC

“We see that revenue...for AI networks almost doubling in 2024.”
-- Broadcom



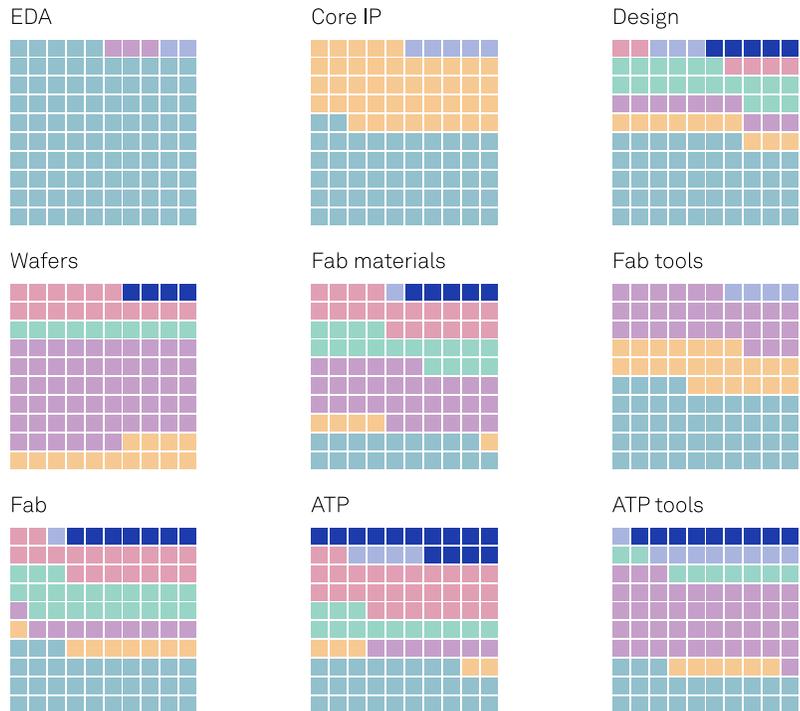
NVIDIA's fiscal year ends in January. CAGR--Compound annual growth rate. Source: IDC "Artificial Intelligence Server and Storage Market Trends and Insights" Nov 2023, "AI Processor and Accelerators Forecast and AI Edge Infrastructure Use Cases" Jul 2023, "Worldwide Artificial Intelligence Software Forecast, 2023-2027" Sep 2023

China Determined To Channel Resources To Close Chip Gap

China's share of the global semi value chain is relatively small and focused on assembly, testing, and packaging

Market share by region

■ Mainland China ■ U.S. ■ Europe ■ Japan ■ Korea ■ Taiwan ■ Others



Obstacles China faces in catching up on advanced chips

- Lack of homegrown breakthrough chip technologies
- Weaker technical capabilities shown by large IP gap
- High reliance on overseas suppliers
- Growing number of restrictions on import of key equipment
- Relatively late entry to sector with highly complex tech



Factors supporting China's semiconductor ambitions



Sizable domestic consumer base



Large and highly educated population



Large internet and tech hardware firms that can support upstream technology companies



Significant capital pool and government's willingness to direct it towards R&D



Comprehensive technology supply-chain infrastructure

EDA—Electronic Design automation software, Core IP—Licensed intellectual property used in chip design, ATP—Assembly, testing, and packaging. Source: S&P Global "China's Chip 'Moon Shot' - The Response To Restrictions" Nov 2, 2023

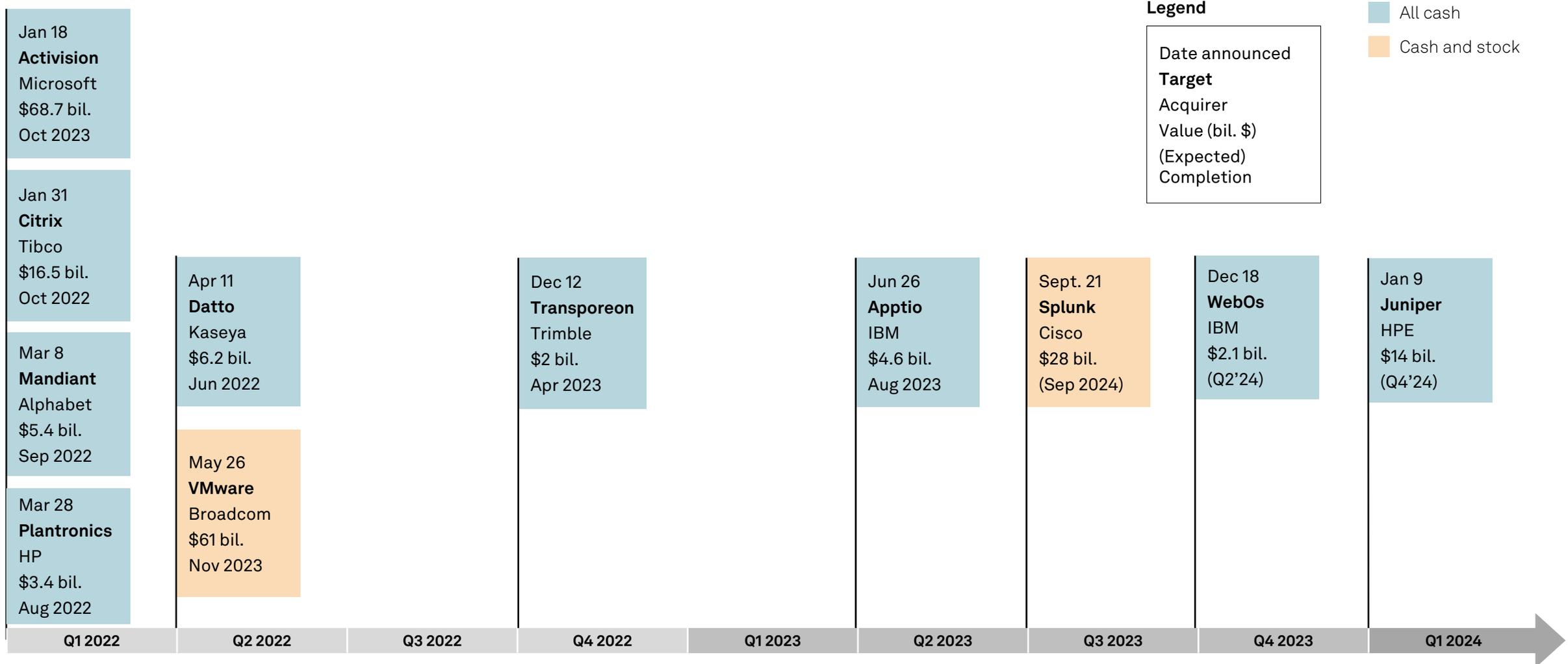
Inventory Digestion & Normalization, A Process In 2024

Inventory level
 High
 Normal
 Low

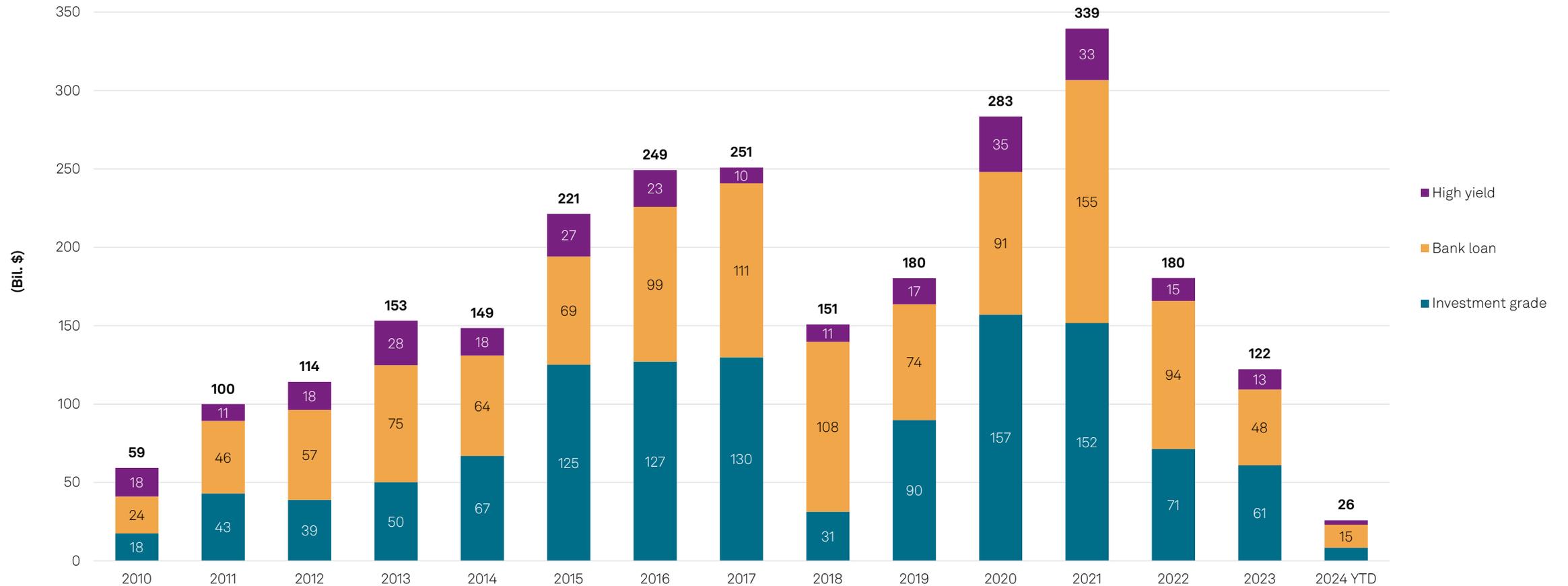
Elevated market inventory		Mild excess market inventory				Normal market inventory	
Memory	Industrial	Networking	Data center	Enterprise	Auto	Mobile	PC
Micron Technology Inc	Analog Devices Inc	Lumentum Holdings Inc	Seagate Technology Holdings plc			Qorvo Inc	
Samsung Electronics Co Ltd	Texas Instruments Inc	CommScope Holding Company Inc	Western Digital Corp				
SK hynix Inc		Ciena Corp					
Western Digital Corp		Coherent Corp			Texas Instruments Inc	Broadcom Inc	Intel Corp
	NXP Semiconductors NV	Cisco Systems Inc	Advanced Micro Devices Inc	Dell Technologies Inc	NXP Semiconductors NV	Apple Inc	Advanced Micro Devices Inc
	ON Semiconductor Corp	Juniper Networks Inc	Intel Corp	Hewlett Packard Enterprise Co	ON Semiconductor Corp	Qualcomm Incorporated	HP Inc
		Hewlett Packard Enterprise Co	Broadcom Inc		TE Connectivity Ltd.	Skyworks Solutions Inc	Dell Technologies Inc
		Broadcom Inc	Marvell Technology Inc		Analog Devices Inc		
		Marvell Technology Inc	Nvidia Corp				

Source: S&P Global Ratings.

Macro And Business Uncertainty Slowing M&A Activity



Declining Rates A Tailwind for M&A, Share Buybacks and Debt Issuance



YTD--Year to date. Source: LCD | As of Feb 1, 2024

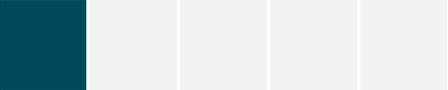
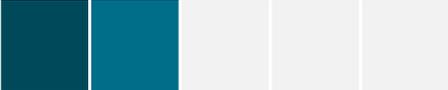
Higher Credit Risks From Hardware Vendors

	Current rating/ Outlook	Industry disruption	Business volatility	Shareholder returns	M&A/Event risk
Dell Technologies Inc.	BBB/Stable	Low risk	Medium risk	Medium risk	Low risk
HP Inc.	BBB/Stable	Medium risk	Medium risk	Medium risk	Low risk
Hewlett Packard Enterprise Co.	BBB/Neg	Medium risk	Low risk	Low risk	High risk
Seagate Technology Holdings PLC	BB/Stable	Low risk	High risk	Low risk	Low risk
Western Digital Corp.	BB/Watch Neg	Medium risk	High risk	Low risk	High risk
Xerox Holdings Corp.	BB/Stable	High risk	Medium risk	Medium risk	Medium risk
CommScope Holding Co. Inc.	CCC/Watch Neg	Medium risk	High risk	Low risk	High risk

 Low risk
  Medium risk
  High risk

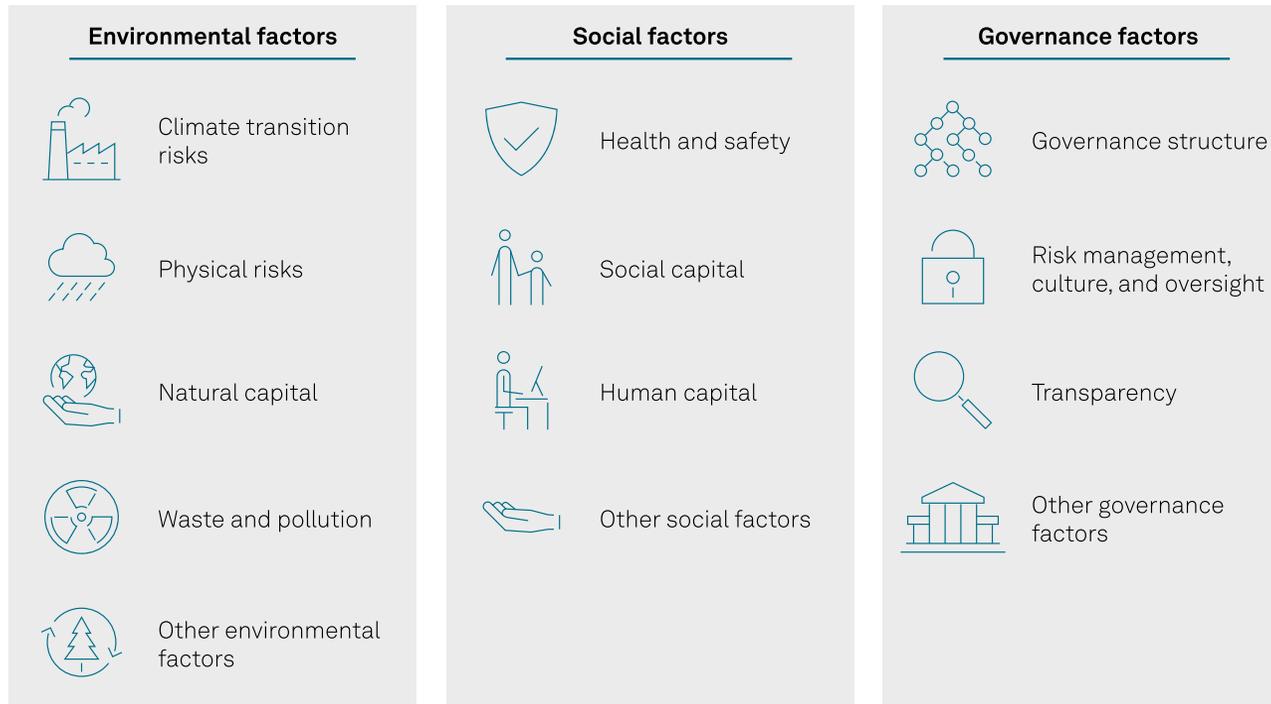
As of Jan 31, 2024. Source: S&P Global Ratings.

Key Rating Triggers For Select U.S. Tech Issuers

Company name	Rating/Outlook	Likely reason for upgrade	Likely reason for downgrade	Ratings headroom
Intel Corp.	A/Neg	Successful process node technology roadmap execution and market share gains that lead to profitability enhancement and leverage <2x.	If competitive position continues to deteriorate, FOCF remains weak with limited prospects for improvement or leverage sustains above 2x.	
IBM Corp.	A-/Stable	Sustainable revenue growth and leverage <2x, while pursuing its shareholder return and acquisition objectives.	Failure to achieve growth due to competitive pressure or more-aggressive financial policy that elevates leverage >2.5.	
Oracle Corp.	BBB/Stable	Moderates financial policy and achieves its acquisition and shareholder return objectives while sustaining leverage of low-3x.	Debt/EBITDA stays above mid-3x.	
Hewlett Packard Enterprise Co.	BBB/Neg	Sustain leverage below 2x through industry cycles, acquisitions, and shareholder returns.	Debt/EBITDA remains above 2x.	
Micron Technology Inc.	BBB-/Stable	If operating margin improves, less-volatile cash flow generation, maintains or expands market share, or leverage <0.5x through industry cycles and acquisitions.	Significant profitability and cash flow weakness resulting in leverage exceeding mid-1x or liquidity under 30% of revenues.	
Western Digital Corp.	BB/Watch Neg	N.A.	One notch downgrade if leverage sustains >4x or FOCF/debt <10% post-spin off. Multiple-notch downgrade if leverage sustains >5x and FOCF/debt in the mid-single-digit % area.	

As of Jan 31, 2024. N.A.--Not applicable. FOCF--Free operating cash flow. Source: S&P Global Ratings.

Environmental, Social, And Governance Factors



Key ESG credit factors: **Global technology**



Governance structure

- Private-equity firms, small groups, individual control ~48% of issuers with focus on maximizing shareholder returns
- Dual-class ownership structure favors founders reduce board's effectiveness



Risk management, culture, and oversight

- Aggressive business strategies that may be difficult to execute
- Strong management oversight with abilities to stay ahead of tech advancements and attract talent



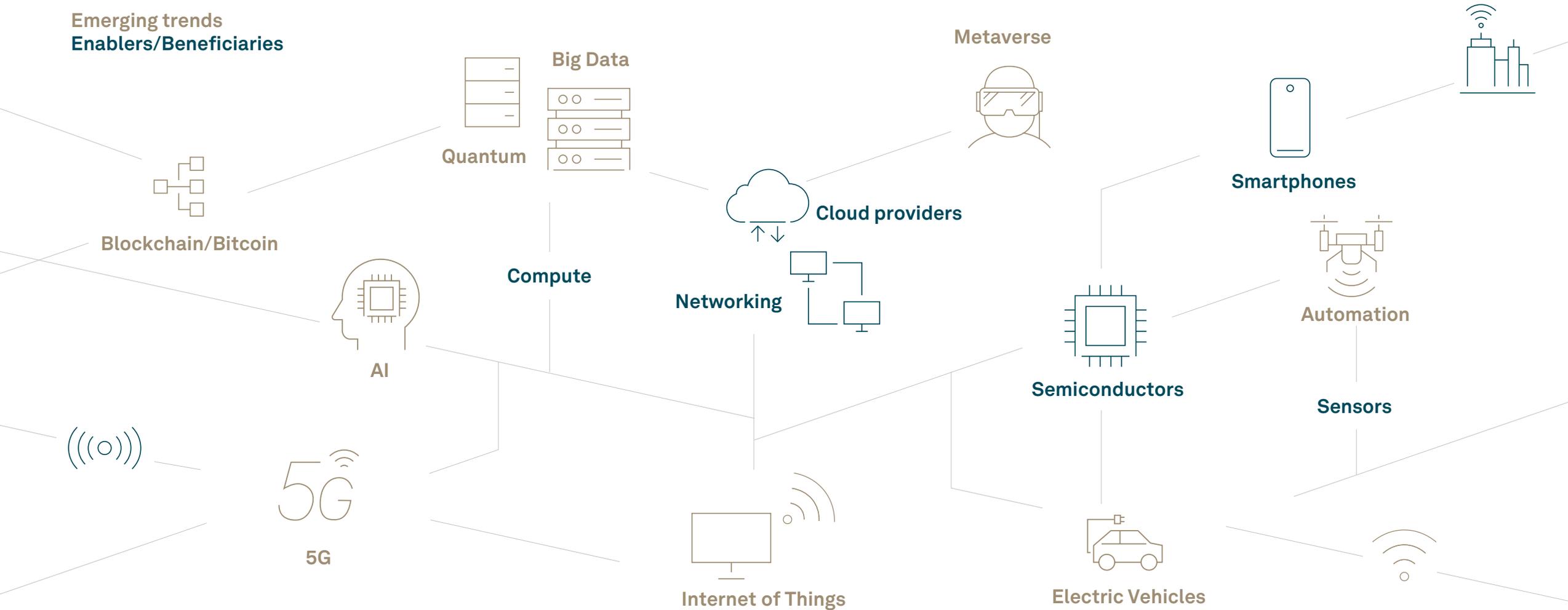
Social capital

- Data security, privacy, regulatory scrutiny increasingly common risks that could result in claims, fines, reputational harm, or business disruption

Source: S&P Global Ratings | "General Criteria: Environmental, Social, And Governance Principles In Credit Ratings" Oct. 10, 2021

Emerging Trends And Enablers

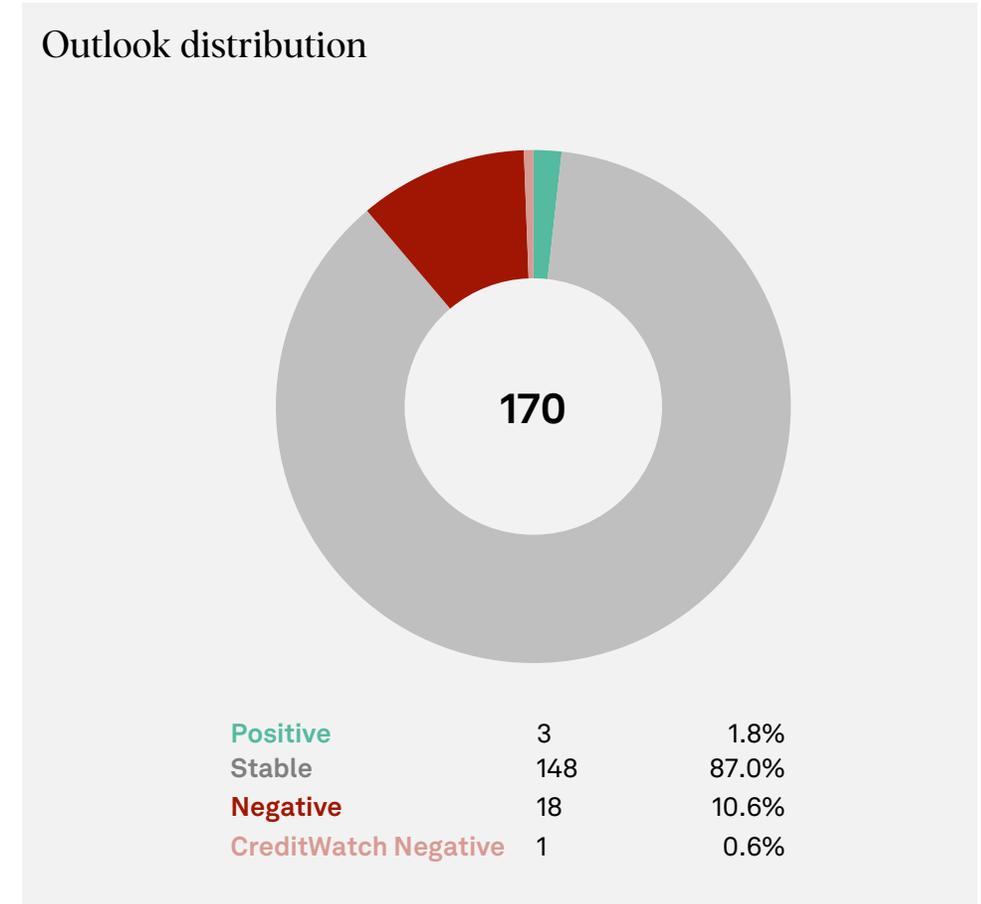
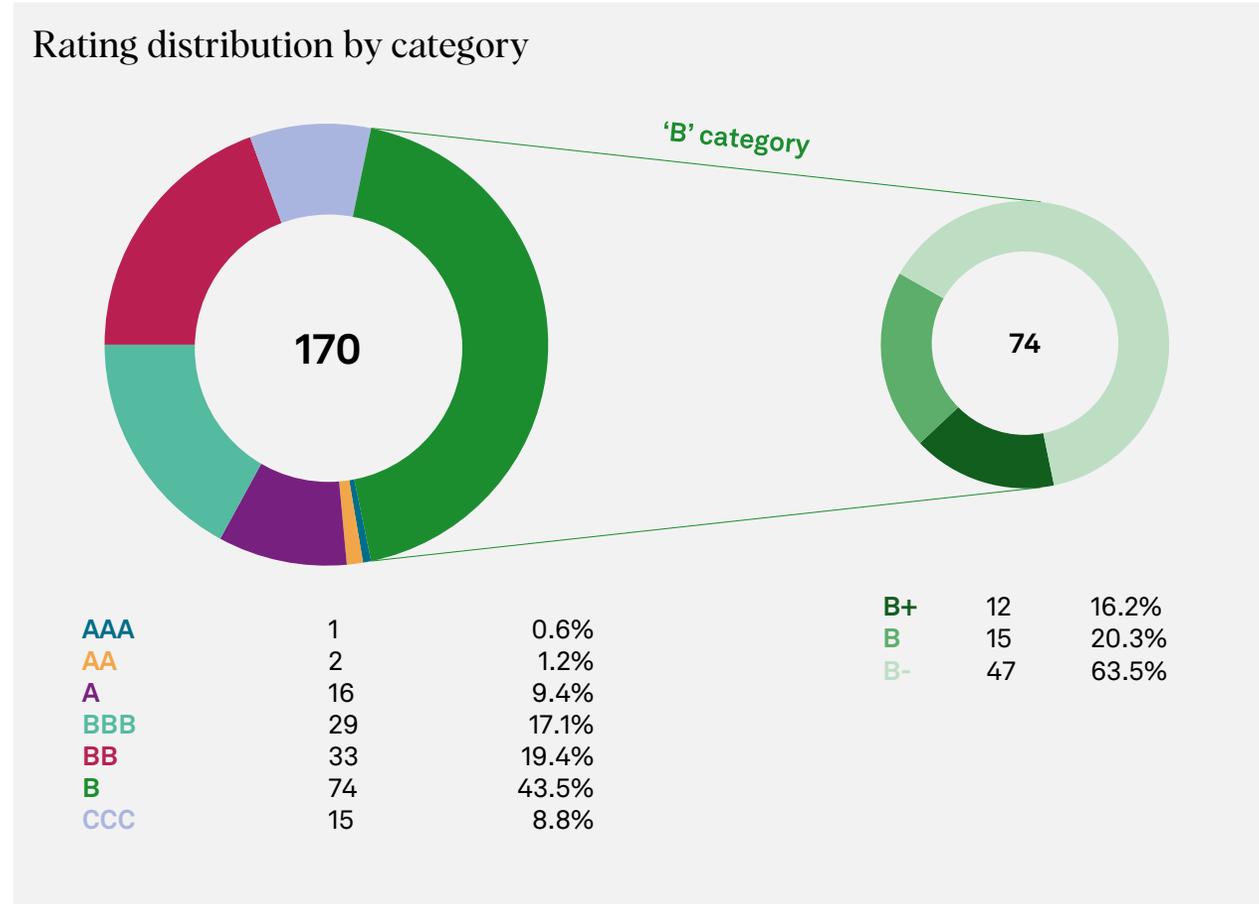
Emerging trends
Enablers/Beneficiaries



Appendix

- U.S. Tech Ratings Overview
- Subsector Breakdown
- Peer Matrix: Hardware
- Peer Matrix: Semiconductor
- Peer Matrix: Software & Services
- U.S. Technology Ratings Team
- U.S. Technology Publications
- U.S. Technology Coverage List By Analyst

U.S. Tech Ratings Overview



As of Jan 31, 2024. Source: S&P Global Ratings.

Subsector Breakdown

Subsector	No. of issuers	Notable companies
Software	88	
Application-specific software	40	Adobe, Autodesk, Intuit, ServiceNow
IT infrastructure/IT management/Security software	31	CrowdStrike, ServiceNow
Enterprise software	17	Microsoft, Oracle
Hardware	47	
Specialty hardware	16	Apple, Corning, Xerox
Enterprise hardware/Networking equipment	11	Cisco, Dell, HP Enterprise
Components	7	TE Connectivity, Amphenol
Distributor	5	Arrow Electronics, Avnet
Electronic manufacturing services	8	Jabil, Flex
Services	5	
IT services	3	IBM
Internet-based services	2	Uber
Semiconductors	30	
Analog/FPGA/discrete	16	Texas Instruments, Qualcomm
Semi cap equipment/Semi manufacturing	9	Applied Materials, Lam Research
Logic/microprocessors	4	Intel, NVIDIA
Memory	1	Micron
Grand total	170	

As of Jan 31, 2024. FPGA--Field programmable gate arrays. Source: S&P Global Ratings.

Hardware

		Financial risk profile					
		Minimal (1)	Modest (2)	Intermediate (3)	Significant (4)	Aggressive (5)	Highly leveraged (6)
Business risk profile	Strong (2)	Apple (AA+), Cisco (AA-)					
	Satisfactory (3)	NetApp (BBB+)	TE Connectivity (A-), Amphenol (BBB+), Corning (BBB+), Dell (BBB), HP Inc. (BBB), Keysight (BBB)	Molex (A-), Arrow (BBB-), Flex (BBB-), Jabil (BBB-), TD SYNNEX (BBB-)	Motorola (BBB-)	Imola Acquisition (BB-)	
	Fair (4)	HPE (BBB/Neg), Juniper (BBB/Neg)	Ciena Corp. (BB+), Sanmina (BB+)	Avnet (BBB-), Crane Holdings, (BB+), Zebra (BB+), TTM Technologies (BB), Xerox (BB)	Belden (BB), Seagate (BB), Western Digital (BB/Watch Neg)	NCR ATMCo (B+), NCR (B+), Pitney Bowes (B+)	VeriFone (B-)
	Weak (5)				Corsair Gaming (BB-/Neg), Viavi Solutions (BB)	Diebold (B)	Plantronics (B+/Watch Pos), Elo Touch (B), Snap One (B), Infinite Holdco (B-), Creation Technologies (B-/Neg), East West Manufacturing (B-/Neg), Emerald Technologies (B-/Watch Neg), Casa Systems (CCC+), Natel (CCC+), Electronics for Imaging (CCC+/Neg), CommScope (CCC/Watch Neg)
	Vulnerable (6)						Avaya (CCC+), Eastman Kodak (CCC+)

As of Jan 31, 2024

Semiconductors

		Financial risk profile					
		Minimal (1)	Modest (2)	Intermediate (3)	Significant (4)	Aggressive (5)	Highly leveraged (6)
Business risk profile	Excellent (1)						
	Strong (2)	NVIDIA (A+), Texas Instruments (A+), Qualcomm (A)		Broadcom (BBB)			
	Satisfactory (3)	Applied Materials (A), AMD (A-), Lam Research (A-)	Intel (A/Neg), Analog Devices (A-), KLA (A-), NXP Semiconductor (BBB+)				
	Fair (4)	Qorvo (BBB-), Skyworks Solutions (BBB-)	Marvell Technology (BBB-), Micron (BBB-), ON Semiconductor (BB+)	Vishay (BB+), Amkor (BB)	Entegris (BB), MKS Instruments (BB)	Coherent (BB-/Neg)	
	Weak (5)		Allegro MicroSystems (B+)	Lattice (BB), Adeia (BB-), Cohu (BB-), MaxLinear (BB-), Synaptics Incorporated (BB-)	Ultra Clean Holdings (B+)		Lumentum (B+/Neg), Altair MidCo (B)
	Vulnerable (6)						

As of Jan 31, 2024. Source: S&P Global Ratings.

Software & Services

		Financial risk profile					
		Minimal (1)	Modest (2)	Intermediate (3)	Significant (4)	Aggressive (5)	Highly leveraged (6)
Business risk profile	Excellent (1)	Microsoft (AAA)					
	Strong (2)	Adobe (A+), Salesforce.com (A+)		IBM (A-)	Oracle (BBB)		
	Satisfactory (3)	Intuit (A-), Autodesk (BBB+), Akamai(BBB+), Cadence Design Systems (BBB+), Fortinet (BBB+), Verisign (BBB), Workday (BBB)		Trimble (BBB-)	SS&C (BB)		Cloud Software Group Holdings, Inc(B)
	Fair (4)	CrowdStrike (BB+)	Infor (BBB)	PTC (BB+)	Gen Digital (BB), RingCentral (BB), ZoomInfo (BB), Uber (BB-/Pos)	Informatica (BB-), CCC Intelligent (B+), SolarWinds (B+)	See next slide
	Weak (5)				Tenable Holdings, Inc. (BB-)	Twilio (BB), Consensus Cloud (B+), EverCommerce (B+), N-able (B+)	See next slide
	Vulnerable (6)						SkillSoft (B-), Astra Acquisition (CCC/Neg)

As of Jan 31, 2024

Software & Services (cont.)

Fair/Highly leveraged	Weak/Highly leveraged	
<p>Elastic N.V. (B+) Genesys Cloud Services Holdings II LLC (B) Project Alpha Intermediate Holding (B) Rocket Software Inc. (B) VS Holding I Inc. (B) Banff Parent Inc. (B-/Pos) Applied Systems Inc. (B-) DCert Buyer Inc. (B-) Epicor Holdings Corp. (B-) Ivanti Software Inc. (B-) McAfee Corp. (B-) Polaris Parent LLC (B-) Proofpoint Inc. (B-) Renaissance Holding Corp. (B-) Sophia L.P. (B-) UKG Inc. (B-) Cornerstone (B-/Neg) Veritas Holdings Ltd. (CCC+/Neg)</p>	<p>E2open LLC (B) ION Corporate Solutions (B) iSolved Inc. (B) LI Group Holdings Inc. (B) PowerSchool Holdings Inc. (B) Quartz AcquireCo LLC (B) Weld North Education LLC (B) Alteryx Inc. (B-) Aspen Jersey Topco Ltd. (B-) Barracuda Networks Inc. (B-) Cloudera Inc. (B-) Delta Topco Inc. (B-) Eclipse Midco Inc. (B-) Flexera Software (B-) Gator Holdco (UK) Ltd. (B-) Imprivata Inc. (B-) Globetrotter Intermediate LLC (B-) HS Midco Inc. (B-) Idera Inc. (B-) Motus Group LLC (B-) OEConnection LLC (B-)</p>	<p>Perforce Intermediate Holdings LLC (B-) Planview Parent Inc (B-) Project Leopard Holdings Inc. (B-) Red Intermediate Co. LLC (B-) Sandvine (B-) Smokey TopCo Ltd. (B-) SonicWall Holdings Ltd. (B-) Starfish Holdco LLC (B-) Upland Software Inc. (B-) Veracode Parent LP (B-) WatchGuard Technologies Inc. (B-) Foundational Education Group Inc. (B-/Neg) QBS Parent Inc. (B-/Neg) Redstone Buyer LLC (B-/Neg) Atlas Midco Inc (CCC+) Cardinal Parent Inc. (CCC+) Intermedia Holdings Inc. (CCC+) Magenta Buyer LLC (CCC+) MicroStrategy Inc. (CCC+) Quest Software US Holdings Inc. (CCC+) GoTo Group Inc. (CCC+/Neg)</p>

As of Jan 31, 2024. Source: S&P Global Ratings.

U.S. Technology Ratings Team



Jesse Juliano
Analytical Manager
Managing Director
Boston
617-530-8317
jesse.juliano
@spglobal.com



David Tsui
Sector Lead
Managing Director
San Francisco
415-371-5063
david.tsui
@spglobal.com



Andrew Chang
Lead Analyst
Director
San Francisco
415-371-5043
andrew.chang
@spglobal.com



Chris Frank
Lead Analyst
Director
San Francisco
415-371-5069
christian.frank
@spglobal.com

Kevin Chen
Senior Analyst
212-438-1045
kevin.chen2
@spglobal.com

Neilson Lin
Associate Director
212-438-1233
neilson.lin
@spglobal.com

Hon Ng
Senior Analyst
212-438-0549
hon.ng
@spglobal.com

Gul Kundra
Senior Analyst
416-507-2566
gul.kundra
@spglobal.com

Ejikeme Okonkwo
Associate Director
212-438-1706
ejikeme.okonkwo
@spglobal.com

Minesh Shilotri
Associate Director
415-371-5064
minesh.shilotri
@spglobal.com

Naim Hernandez
Senior Analyst
212-438-0632
naim.hernandez
@spglobal.com



Tuan Duong
Lead Analyst
Director
New York
212-438-5327
tuan.duong
@spglobal.com



James Thomas
Lead Analyst
Director
New York
212-438-0181
james.w.thomas
@spglobal.com

U.S. Technology Publications

- [Industry Credit Outlook 2024: Technology](#), Jan. 9, 2024
- [As Recession Concerns Fade, 'B' Rated U.S. Tech Issuers Aren't Out Of The Woods](#), Nov. 28, 2023
- [Gen AI Is Writing A New Credit Story For Tech Giants](#), Nov. 13, 2023
- [U.S. Tech Earnings Q3 2023: Cautious Enterprise Spending And Weakening Industrial Market Hinder Results](#), Nov. 9, 2023
- [More Risks Ahead For Global Technology Companies As U.S. Restrictions Tighten](#), Nov. 8, 2023
- [China's Chip 'Moonshot' – The Response To Restrictions](#), Nov. 2, 2023
- [Global Tech's Shift From China: The Effects By Firm](#), May 3, 2023
- [Global Tech's Moves From China Will Be Costly...And Unavoidable](#), Apr 20, 2023
- [Tighter Credit Conditions May Be Next Shoe To Drop For Speculative-Grade Tech Companies](#), Apr. 3, 2023
- [Excess Inventory Is The First Roadblock To Tech Recovery](#), Mar. 31, 2023
- [U.S. Tech Bracing For The Credit Storm: Ripples Now With A Chance Of Bigger Waves](#), Dec. 6, 2022
- [Technology And Geopolitics: What If The Semiconductor Industry Bifurcates?](#), Nov. 13, 2022
- [U.S. Chips On A New Block With Expanded China Restrictions](#), Oct. 19, 2022
- [ESG Materiality Map – Technology Hardware and Semiconductors](#), Oct. 19, 2022
- [ESG Materiality Map – Technology Software and Services](#), Oct. 19, 2022
- [Less Money, More Problems For U.S. Tech Companies As Economic Woes Continue To Rise](#), Aug. 30, 2022
- [Tech Stability Wobbles On Rocky Macroeconomics Despite Anticipated Supply Chain Relief](#), Jul. 13, 2022
- [Cutting China From Supply Chains--Easy To Say, Hard To Do](#), Jun. 1, 2022

U.S. Technology Coverage List by Analyst



David Tsui
Sector Lead

Advanced Micro Devices Inc.
Apple Inc.
Intel Corp.
Qualcomm Incorporated



Andrew Chang
Lead Analyst

Adobe Inc.
Amkor Technology Inc.
Autodesk
Broadcom Inc.
Dell Technologies Inc
Hewlett Packard Enterprise Co.
HP Inc.
Micron Technology Inc.
Microsoft Corp.
NetApp Inc.
NVIDIA Corp.



Chris Frank
Lead Analyst

Analog Devices Inc.
Banff Parent Inc.
Cisco Systems Inc.
Gen Digital Inc.
Oracle Corp.
Qorvo Inc.
Seagate Technology Holdings PLC
Skyworks Solutions Inc.
Western Digital Corp.



Tuan Duong
Lead Analyst

Cloud Software Group Holdings Inc.
Flex Ltd.
Jabil Inc.
NCR ATMCo LLC
NCR Corp.
NXP Semiconductors N.V.
Salesforce.com Inc.
Texas Instruments Inc.
Trimble Inc.
Uber Technologies Inc.
Veritas Holdings Ltd.



James Thomas
Lead Analyst

Applied Materials Inc.
Fortinet Inc.
IBM Corp.
KLA Corp.
Lam Research Corp.

U.S. Technology Coverage List by Analyst



James Thomas
Lead Analyst

Adeia Inc.
Akamai Technologies
Altair MidCo Inc.
Cohu Inc.
Corsair Gaming Inc.
Entegris Inc.
Flexera Software LLC
LI Group Holdings Inc.
MKS Instruments Inc.
N-able LLC
Perforce Intermediate Holdings LLC
QBS Parent Inc.
Smokey TopCo Ltd.
Synaptics Inc.
Twilio Inc.
Ultra Clean Holdings
Veracode Parent L.P.
VS Holding I Inc.
Weld North Education



Minesh Shilotri
Associate Director

Astra Acquisition Corp.
Coherent Corp.
CrowdStrike Holdings Inc.
Delta Topco Inc.
Idera Inc.
Intuit Inc.
Juniper Networks Inc.
Magenta Buyer LLC
MaxLinear Inc.
McAfee Corp.
PowerSchool Holdings Inc.
Proofpoint Inc.
Renaissance Holding Corp.
SkillSoft Corp.
SolarWinds Holdings Inc.
TTM Technologies Inc.
Vishay Intertechnology Inc.



Ejikeme Okonkwo
Associate Director

Allegro MicroSystems Inc.
Amphenol Corp.
Arrow Electronics Inc.
Avnet Inc.
CCC Intelligent Solutions Inc.
Genesys Cloud Services Holdings II LLC
Keysight Technologies Inc.
Lattice Semiconductor Corp.
Marvell Technology Group Ltd.
Molex Electronic Technologies LLC
ON Semiconductor Corp.
Pitney Bowes Inc.
Polaris Parent LLC
RingCentral Inc.
ServiceNow Inc.
TE Connectivity Ltd.
Workday Inc.
Xerox Corp.
Zebra Technologies Corp.



Neilson Lin
Associate Director

Cadence Design Systems Inc.
CommScope Holding Co. Inc.
Cornerstone OnDemand Inc.
Corning Inc.
Creation Technologies Inc.
East West Manufacturing LLC
Electronics for Imaging Inc.
Emerald Technologies
Acquisition Co. Inc.
Gator Holdco (UK) Ltd.
Infor Inc.
Lumentum Holdings Inc.
MicroStrategy Inc.
Motorola Solutions Inc.
Natel Engineering Co. LLC
Sandvine L.P.
UKG Inc.

U.S. Technology Coverage List by Analyst



Naim Hernandez
Senior Analyst

Belden Inc.
Cloudera Inc.
Crane Holdings Co.
Diebold Nixdorf Inc.
EverCommerce Inc.
GoTo Group Inc.
ION Corporate Solutions Finance Ltd.
OEConnection LLC
Sanmina Corp.
Snap One Holdings Corp.
VeriFone Systems Inc.
VeriSign Inc.
Viavi Solutions Inc.
ZoomInfo Technologies Inc.



Kevin Chen
Senior Analyst

Atlas Midco Inc.
Avaya Holdings Corp.
Casa Systems Inc.
Ciena Corp.
Elastic N.V.
Epicor Holdings Corp.
Foundational Education Group Inc.
Imola Acquisition Corp.
Infinite Holdco LLC
Informatica Inc.
Intermedia Holdings Inc.
Project Alpha Intermediate Holding Inc.
Project Leopard Holdings Inc.
PTC Inc.
Red IntermediateCo LLC
Sophia L.P.
SS&C Technologies Holdings Inc.
TD SYNnex Corp.



Hon Ng
Senior Analyst

Barracuda Networks Inc.
Eastman Kodak Co.
Eclipse Midco Inc.
HS Midco Inc.
Imprivata Inc.
iSolved Inc.
Motus Group LLC
Quartz AcquireCo LLC
Quest Software US Holdings Inc.
Redstone Buyer LLC
SonicWall Holdings Ltd.
Starfish Holdco LLC
Tenable Holdings Inc.
Upland Software Inc.



Gul Kundra
Senior Analyst

Alteryx Inc.
Applied Systems Inc.
Aspen Jersey Topco Ltd.
Cardinal Parent Inc.
Consensus Cloud Solutions Inc.
DCert Buyer Inc.
Elo Touch Solutions Inc.
E2open LLC
Globetrotter Intermediate LLC
Ivanti Software Inc.
Planview Parent Inc.
Rocket Software Inc.
WatchGuard Technologies Inc.

U.S. Technology Services Coverage



Nishit Madlani

Managing Director

Sector Lead – Autos, Business & Technology Services
212-438-4070
nishit.madlani
@spglobal.com

ADT Inc.
Anywhere Real Estate Group LLC
Apple Bidco, LLC
APX Group Holdings Inc.
Ascensus Group Holdings, Inc.
Asplundh Tree Expert LLC
Atlas CC Holding LLC
Atlas Ontario L.P.
Automatic Data Processing Inc.
BCPE Empire Holdings Inc.
Black Knight Inc.
Brink's Co. (The)
Broadridge Financial Solutions Inc.
Brown Bidco Ltd.
CDK Global II LLC
CDW Corp.

Cintas Corp.
Concentrix Corp.
CoreLogic Inc.
DXC Technology Co.
Equifax Inc.
Fidelity National Information Services Inc.
Fiserv Inc.
Foundever Group SA
Global Payments Inc.
Go Daddy Operating Co. LLC
I-Logic Technologies Bidco Ltd.
Iron Mountain Inc.
Jacobs Engineering Group Inc.
Kyndryl Holdings Inc.
LHS Borrower LLC
MSCI Inc.

Newfold Digital Holdings Group Inc.
Project Boost Purchaser LLC
Rackspace Technology Global Inc.
RealPage Inc.
Spin Holdco Inc.
Staples Inc.
Tempo Acquisition LLC
TransUnion
Verisk Analytics Inc.
WeWork Companies LLC
WMB Holdings Inc.

Copyright © 2024 by Standard & Poor's Financial Services LLC. All rights reserved.

No content (including ratings, credit-related analyses and data, valuations, model, software or other application or output therefrom) or any part thereof (Content) may be modified, reverse engineered, reproduced or distributed in any form by any means, or stored in a database or retrieval system, without the prior written permission of Standard & Poor's Financial Services LLC or its affiliates (collectively, S&P). The Content shall not be used for any unlawful or unauthorized purposes. S&P and any third-party providers, as well as their directors, officers, shareholders, employees or agents (collectively S&P Parties) do not guarantee the accuracy, completeness, timeliness or availability of the Content. S&P Parties are not responsible for any errors or omissions (negligent or otherwise), regardless of the cause, for the results obtained from the use of the Content, or for the security or maintenance of any data input by the user. The Content is provided on an "as is" basis. S&P PARTIES DISCLAIM ANY AND ALL EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE, FREEDOM FROM BUGS, SOFTWARE ERRORS OR DEFECTS, THAT THE CONTENT'S FUNCTIONING WILL BE UNINTERRUPTED, OR THAT THE CONTENT WILL OPERATE WITH ANY SOFTWARE OR HARDWARE CONFIGURATION. In no event shall S&P Parties be liable to any party for any direct, indirect, incidental, exemplary, compensatory, punitive, special or consequential damages, costs, expenses, legal fees, or losses (including, without limitation, lost income or lost profits and opportunity costs or losses caused by negligence) in connection with any use of the Content even if advised of the possibility of such damages.

Credit-related and other analyses, including ratings, and statements in the Content are statements of opinion as of the date they are expressed and not statements of fact. S&P's opinions, analyses, and rating acknowledgment decisions (described below) are not recommendations to purchase, hold, or sell any securities or to make any investment decisions, and do not address the suitability of any security. S&P assumes no obligation to update the Content following publication in any form or format. The Content should not be relied on and is not a substitute for the skill, judgment and experience of the user, its management, employees, advisors and/or clients when making investment and other business decisions. S&P does not act as a fiduciary or an investment advisor except where registered as such. While S&P has obtained information from sources it believes to be reliable, S&P does not perform an audit and undertakes no duty of due diligence or independent verification of any information it receives. Rating-related publications may be published for a variety of reasons that are not necessarily dependent on action by rating committees, including, but not limited to, the publication of a periodic update on a credit rating and related analyses.

To the extent that regulatory authorities allow a rating agency to acknowledge in one jurisdiction a rating issued in another jurisdiction for certain regulatory purposes, S&P reserves the right to assign, withdraw, or suspend such acknowledgement at any time and in its sole discretion. S&P Parties disclaim any duty whatsoever arising out of the assignment, withdrawal, or suspension of an acknowledgment as well as any liability for any damage alleged to have been suffered on account thereof.

S&P keeps certain activities of its business units separate from each other in order to preserve the independence and objectivity of their respective activities. As a result, certain business units of S&P may have information that is not available to other S&P business units. S&P has established policies and procedures to maintain the confidentiality of certain nonpublic information received in connection with each analytical process.

S&P may receive compensation for its ratings and certain analyses, normally from issuers or underwriters of securities or from obligors. S&P reserves the right to disseminate its opinions and analyses. S&P's public ratings and analyses are made available on its Web sites, www.spglobal.com/ratings (free of charge) and www.ratingsdirect.com (subscription) and may be distributed through other means, including via S&P publications and third-party redistributors. Additional information about our ratings fees is available at www.spglobal.com/ratings/usratingsfees.

Australia: S&P Global Ratings Australia Pty Ltd holds Australian financial services license number 337565 under the Corporations Act 2001. S&P Global Ratings' credit ratings and related research are not intended for and must not be distributed to any person in Australia other than a wholesale client (as defined in Chapter 7 of the Corporations Act).

STANDARD & POOR'S, S&P and RATINGSDIRECT are registered trademarks of Standard & Poor's Financial Services LLC.

spglobal.com/ratings

S&P Global
Ratings