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MassVision2050

Semiconductors

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MASSACHUSETTS
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Definition of Semiconductors

Materials that can act as both conductors and insulators of current flow, thus providing a way to control the flow of electrical current. They are an essential component of electronic devices, and are therefore applied in computing, communications, military systems, energy, transportation and industrial activities, among many other applications

Approach to quantifying market share and economic competitiveness:

- Analyze the estimated market size (by revenue) of the semiconductor industry, segmented by device type, application and geography
- Analyze GDP data for semiconductor manufacturing in MA and the rest of the US
- Aggregate job postings and professional profiles that use keywords related to semiconductors, including:
 - Semiconductor Machinery Manufacturing
 - Semiconductor and Related Device Manufacturing
- Analyze locations of companies with significant semiconductor-related job postings and revenue
- Review VC investment in semiconductor-related fields across MA and the rest of the US
- Identify notable startups and exits in the space

Executive Summary: Semiconductors

Preliminary

Macro Trends

- The global semiconductor market is currently valued at ~\$672B and projected to grow at over 8% CAGR over the next five years
- ~80% of manufacturing is now concentrated in East Asia countries. with China experiencing the fastest growth rates and projected to be manufacturing leader
- MA houses one of the largest semiconductor sectors in the country (ranked 5th) and the industry accounts for a larger share of both GDP (~0.4%) and employment (~0.3%) in MA than the national average, but growth has trailed both the US semiconductor sector and MA's overall economy in both GDP and employment
- The state has the 5th highest wages among top states for semiconductor employment (with CA leading by a wide margin)
- Growth for semiconductor manufacturing employment in MA is expected to remain positive but at a slower rate than the US overall, with the US growth forecasted to outpace MA by 0.5% by 2034

Talent Supply and Demand

- MA does not produce enough graduates to fill open roles in many of the top in-demand occupations in the semiconductor sector, however, 8 out of the top 15 in-demand occupations do not require a Bachelor's degree
- ~12.5K semiconductor-related degrees (engineering, engineering technicians, physical science) were granted in 2023; the number of degree graduates grew by 1.7% since 2018
- Top in-demand skills for semiconductor-related jobs are engineering and computer programming skills (electrical engineering, computer science), as well as general computing and engineering skills, and those with the most growth in frequency are related: electronics, artificial Intelligence, and application specific integrated circuits
- ~60% of the demand for semiconductor-related roles in MA comes from 5 companies: Analog Devices, Applied Materials, Intel, Skyworks, and AMD






Startup and Investment Landscape

- MA institutions have ~\$370M in active grants for semiconductor-related R&D from the NSF as of August 2025; MIT receives nearly a third of total semiconductor R&D funding in MA from the NSF
- MA semiconductor and semiconductor machinery companies invested \$1.5B in R&D in 2022 at a growth rate of 2% since 2021, as compared to a 15% growth in company funding overall
- \$661M in venture capital funding has been invested in MA Semiconductors industry over the past 5 years, there have been 14 M&As among semiconductor startups in MA since 2020

Objectives for today

- **Macro trends and dynamics**
- Talent supply and demand
- Startup and investment landscape

Semiconductors can be classified into 5 main device types, of which logic and memory ICs represent the largest markets¹

Device types ²	Description	Key device sub-segments	% of industry revenue
 Logic	A digital semiconductor device that processes digital bits in specialized ways defined by mask programming or field programming	FPGAs Standard logic Logic ASICs	36%
 Memory	An electronic data storage device. often used as computer memory. implemented on a semiconductor based integrated circuit	DRAM SRAM Flash	25%
 Micro-components	Micro-components are programmable logic ICs that operate on a sequence of instructions	Microprocessors Microcontrollers Digital signal processors	14%
 Analog	Analog ICs process continuous signals including voltage. current. frequency. phase. duty cycle and other electronic parameters	Amplifiers Voltage regulators Data converters Interface	12%
 Discrete	An individual electronic circuit that is built out of discrete components. Performs a single function affecting the flow of electrical current	RF & microwave Power transistors Rectifiers / power diodes Small signal transistors	5%

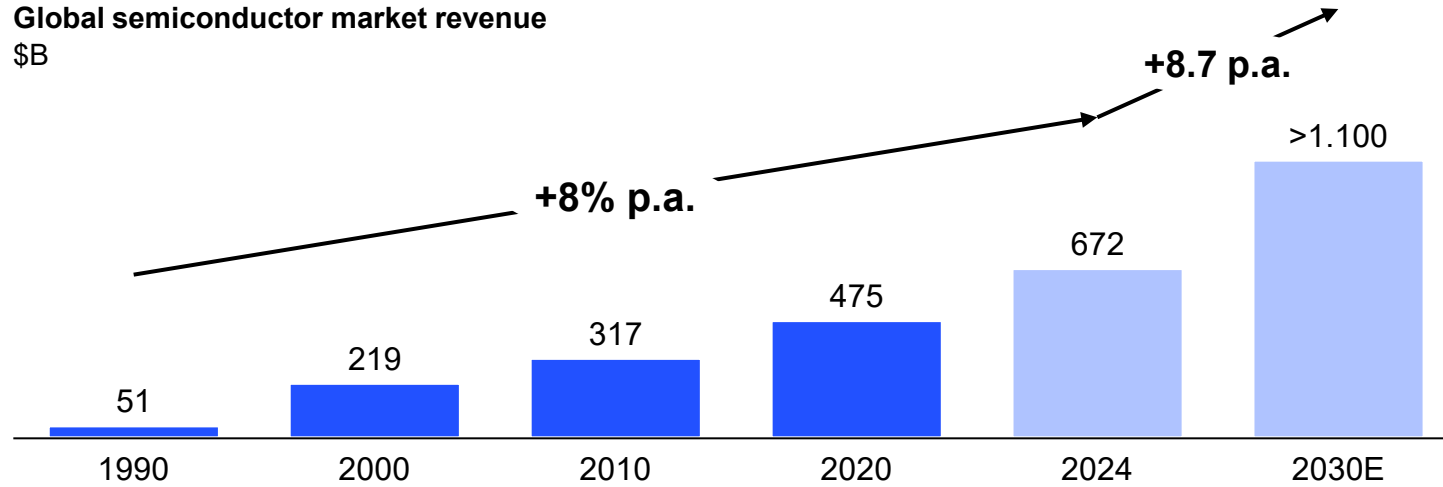
¹ Semiconductor manufacturing equipment (as a separate market) is currently valued at ~\$115bn (wafer FAB eqp only) and expected to grow at ~5% CAGR to 2030

² Excluding optical semiconductors and sensors. Collectively 8% of 2024 global revenue (\$672bn)

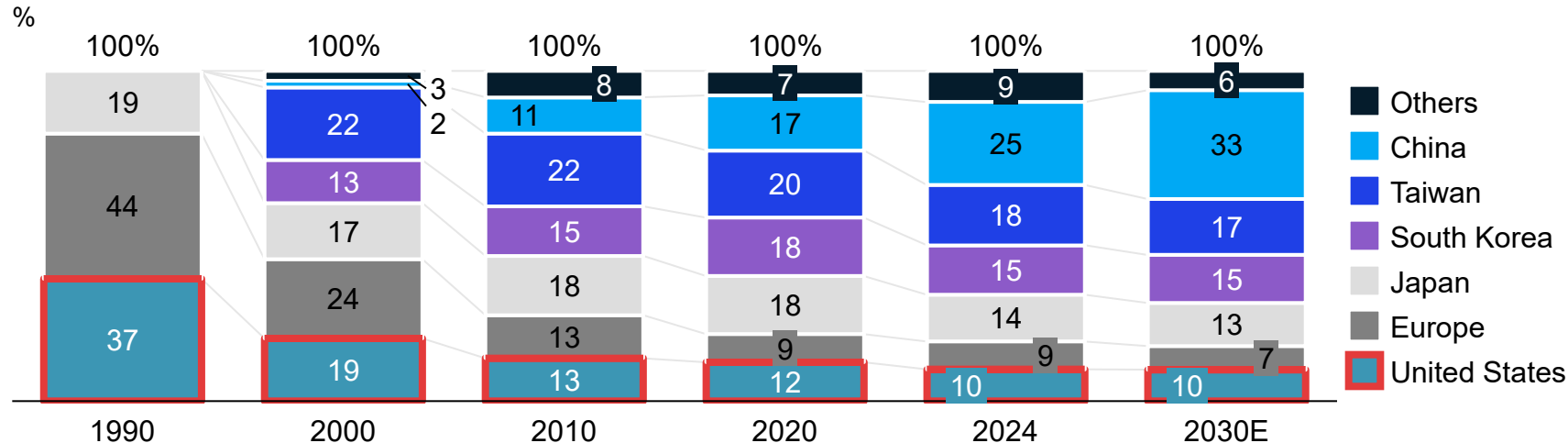
The global semiconductor market is currently valued at ~\$672B and projected to grow over 8% CAGR over the next years

US share of manufacturing capacity declining since 1990

Global semiconductor market revenue
\$B



Geographic share of semiconductor manufacturing capacity
%

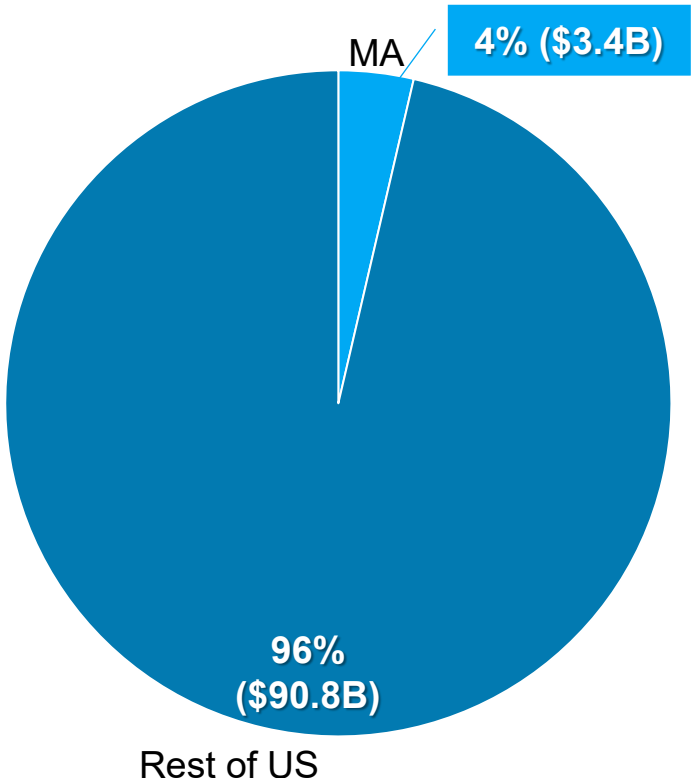


- The global semiconductor market is expected to continue strong growth and reach well over 1\$tr by 2030 (highly sensitive to AI uptick scenarios)
- ~80% of manufacturing is now concentrated in East Asia countries, with China having the fastest growth rates and projected to be the undisputed manufacturing leader (in capacity terms)
- However, the US CHIPS Act of 2022 directs ~\$280B in spending over the next 10 years and ~\$200B of new fab builds have been announced in >10 states with NY, Texas and Arizona getting the majority of investment (~\$170bn combined)

MA houses one of the largest semiconductor sectors in the country (ranked 5th), but job growth ranks 8th among the top 10 states

US semiconductor GDP

National semiconductor GDP reached \$94.3B in 2024, with Massachusetts providing a 4% share

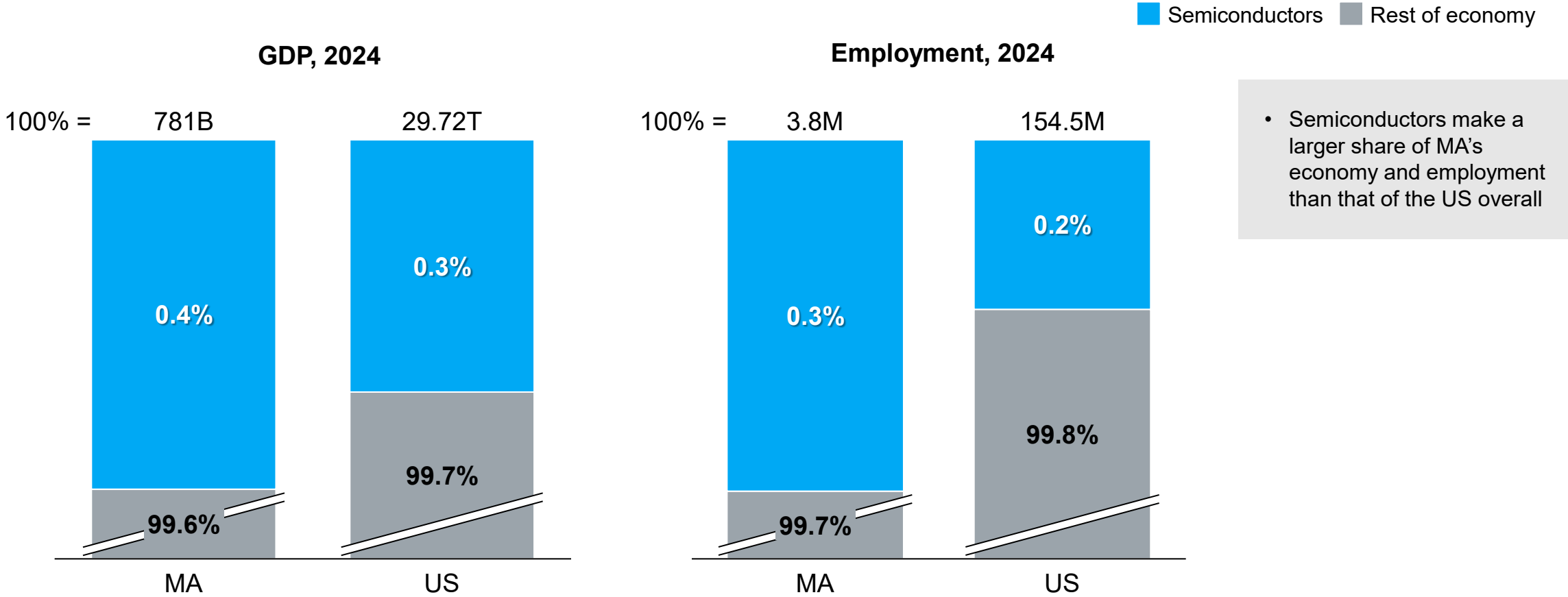


Rank	State	2024 semiconductor workforce, Ths.	Share of workforce, 2024, %	Projected job growth, 2024-2029 CAGR
1	California	59.2	0.3%	0.5%
2	Oregon	36.0	0.3%	1.7%
3	Texas	33.6	1.7%	1.5%
4	Arizona	23.6	0.7%	1.4%
5	Massachusetts	11.9	0.3%	0.6%
6	Florida	9.3	0.1%	1.4%
7	New York	8.7	0.1%	1.2%
8	Idaho	6.7	0.8%	-2.2%
9	North Carolina	6.2	0.1%	2.2%
10	Washington	4.4	0.1%	4.4%

The semiconductor sector accounts for ~0.4% of MA's GDP and ~0.3% of employment, larger shares than those of the US overall

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Semiconductor GDP and employment as share of total economy %



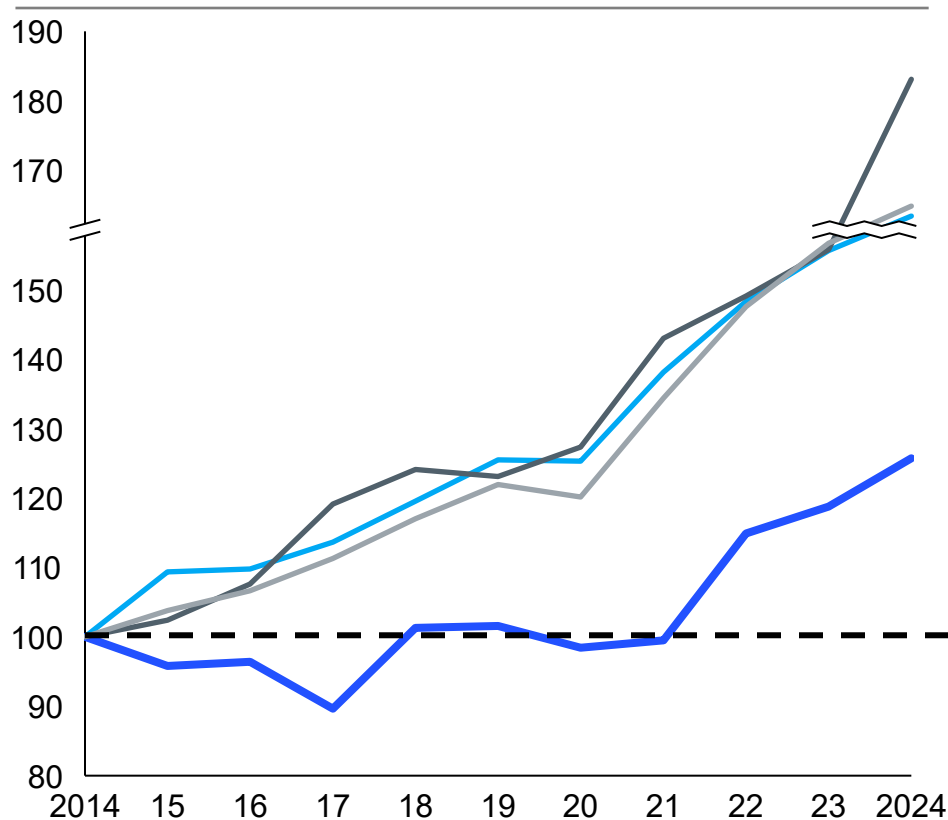
MA's semiconductor growth has been on an upward trajectory since 2020 but still lags US and the state's overall economic growth in both GDP and employment

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— MA Semiconductor — MA total — US Semiconductor — US total

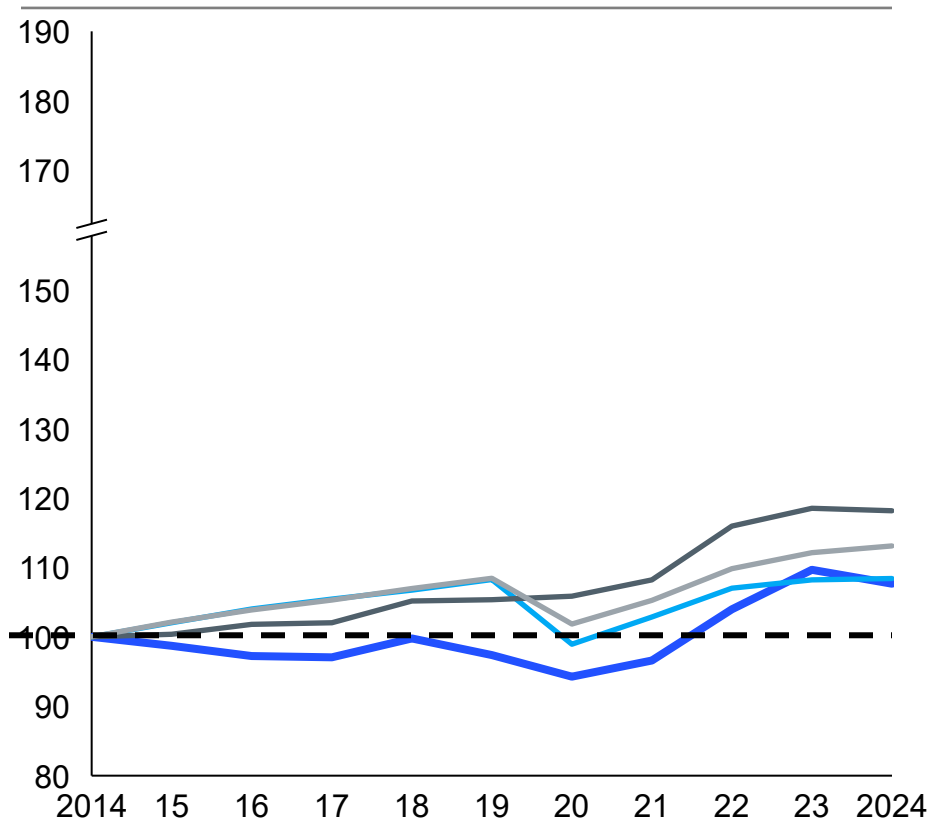
Semiconductor GDP Growth

Indexed to 2014



Semiconductor Employment Growth

Indexed to 2014



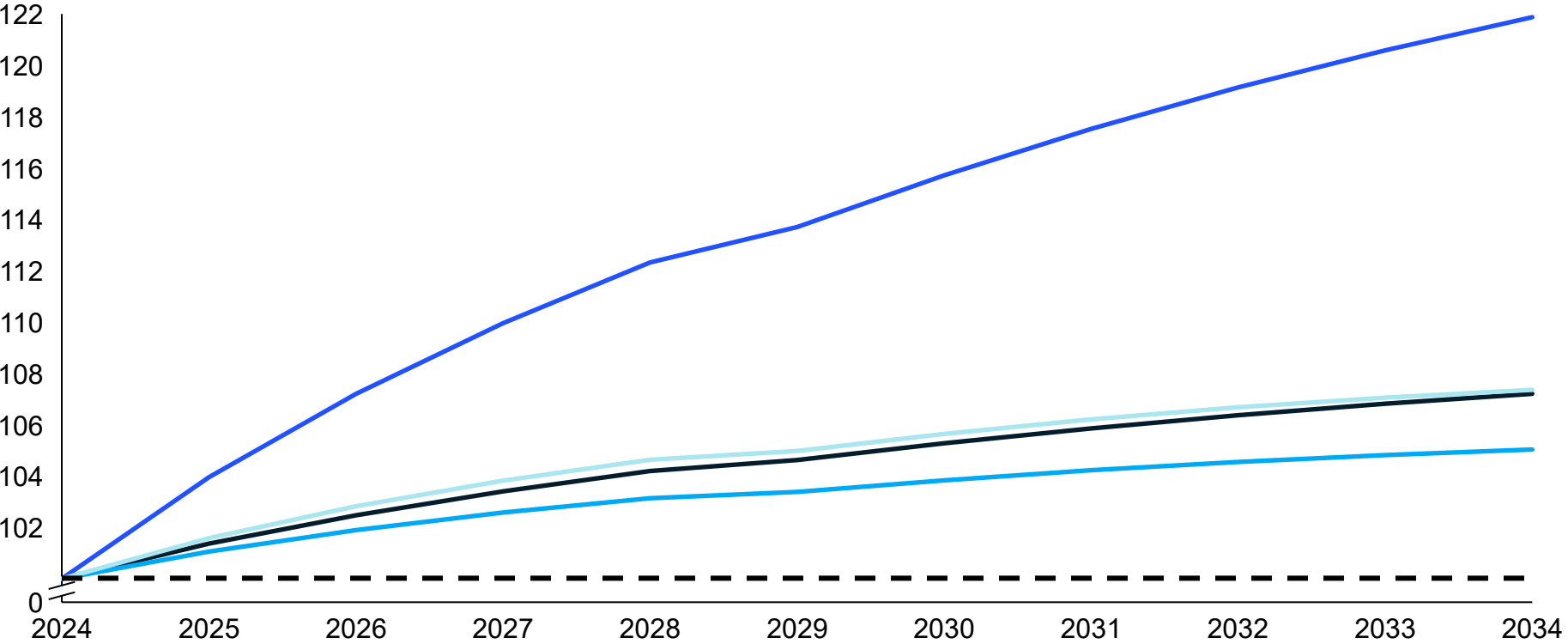
- Since 2014, MA's semiconductor sector GDP and employment grew slower than MA's overall economy and the national semiconductor sector
- MA's semiconductor sector has had a sharp growth trajectory since 2020. Employment has also increased in this period, aligning more closely with the state's total employment growth

MA's semiconductor sector employment is expected to grow over the next 10 years, but at a slower rate than the overall state economy and national semiconductor sector

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Semiconductor Employment Growth Forecast
Indexed to 2024

— MA semiconductor — US semiconductor
— MA total economy — US total economy



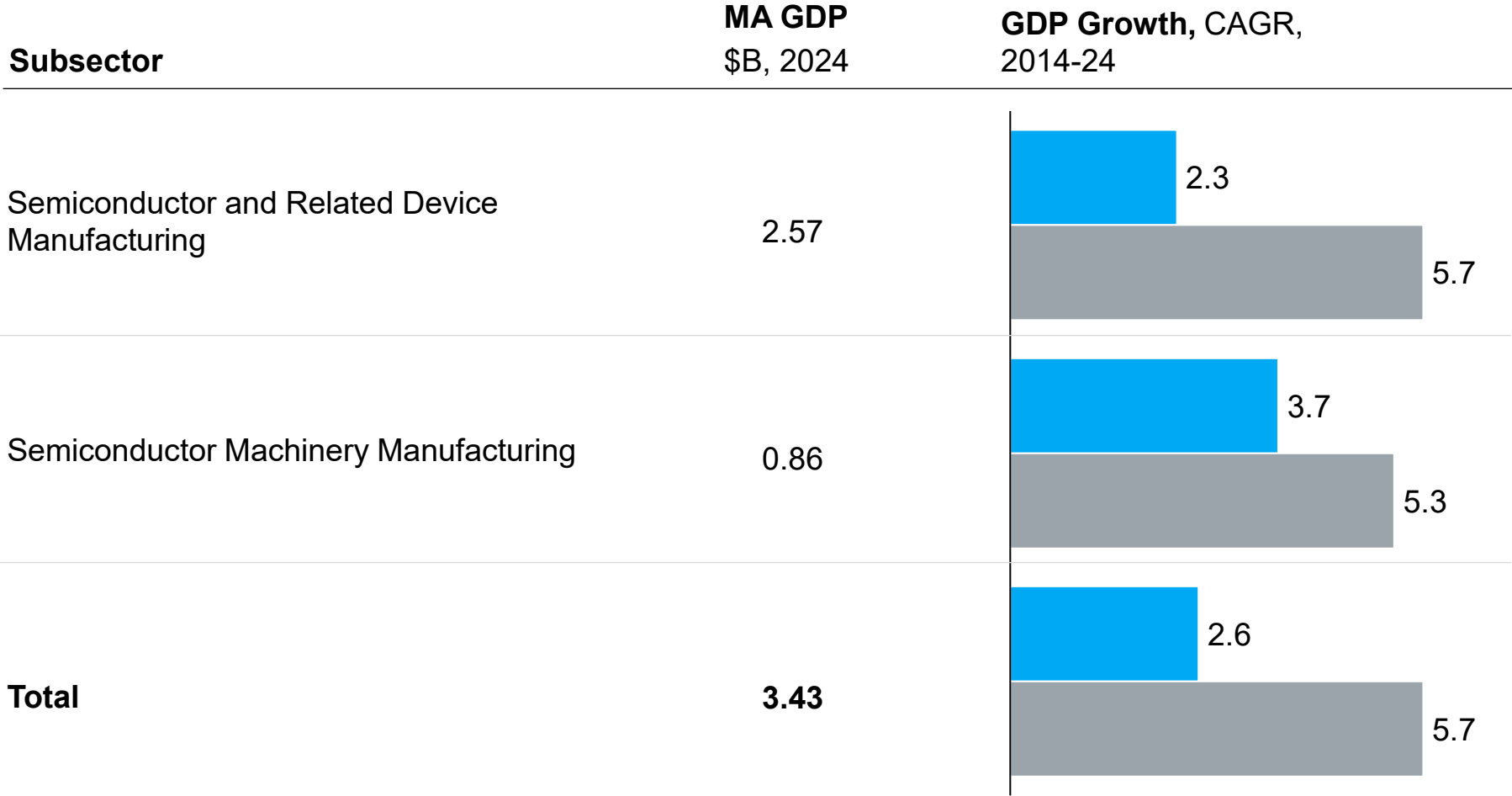
- MA Semiconductor sector growth is expected to remain positive and relatively steady (0.7% historical, 0.5% forecasted growth rate). Nationally growth is expected to decline slightly (1.5% historical, 1.0% forecasted growth rate)

MA's semiconductor GDP growth lagged that of the US across subsectors

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■ MA ■ US

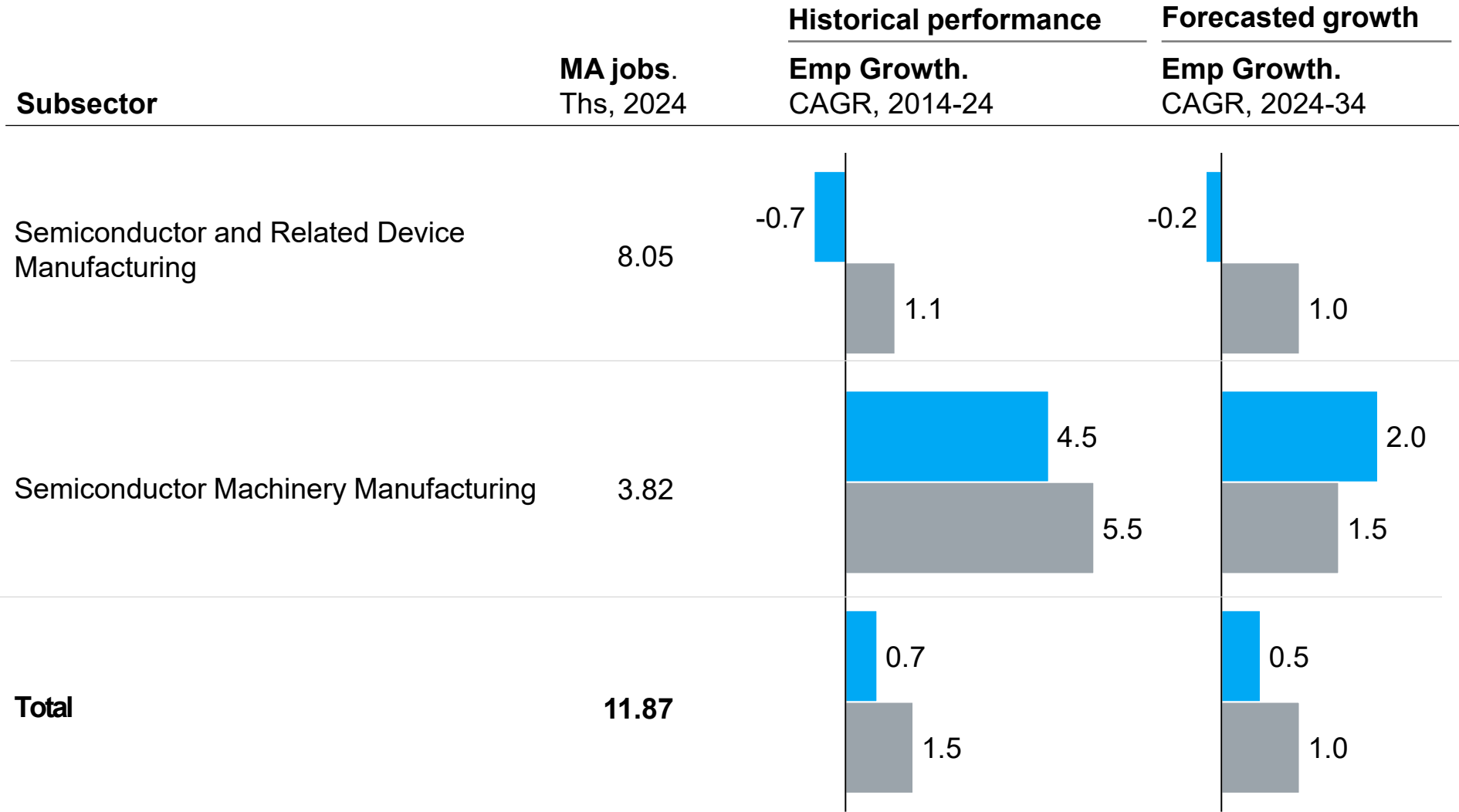
Historical performance



- Semiconductor machinery manufacturing is a smaller sub-sector in MA, but has experienced stronger growth than the semiconductor and related device manufacturing subsector
- Growth of US semiconductor GDP outpaced MA by a significant margin

Looking forward, semiconductor manufacturing employment in MA and US overall is expected to remain positive; growth in the Semiconductor machinery manufacturing subsector will slow

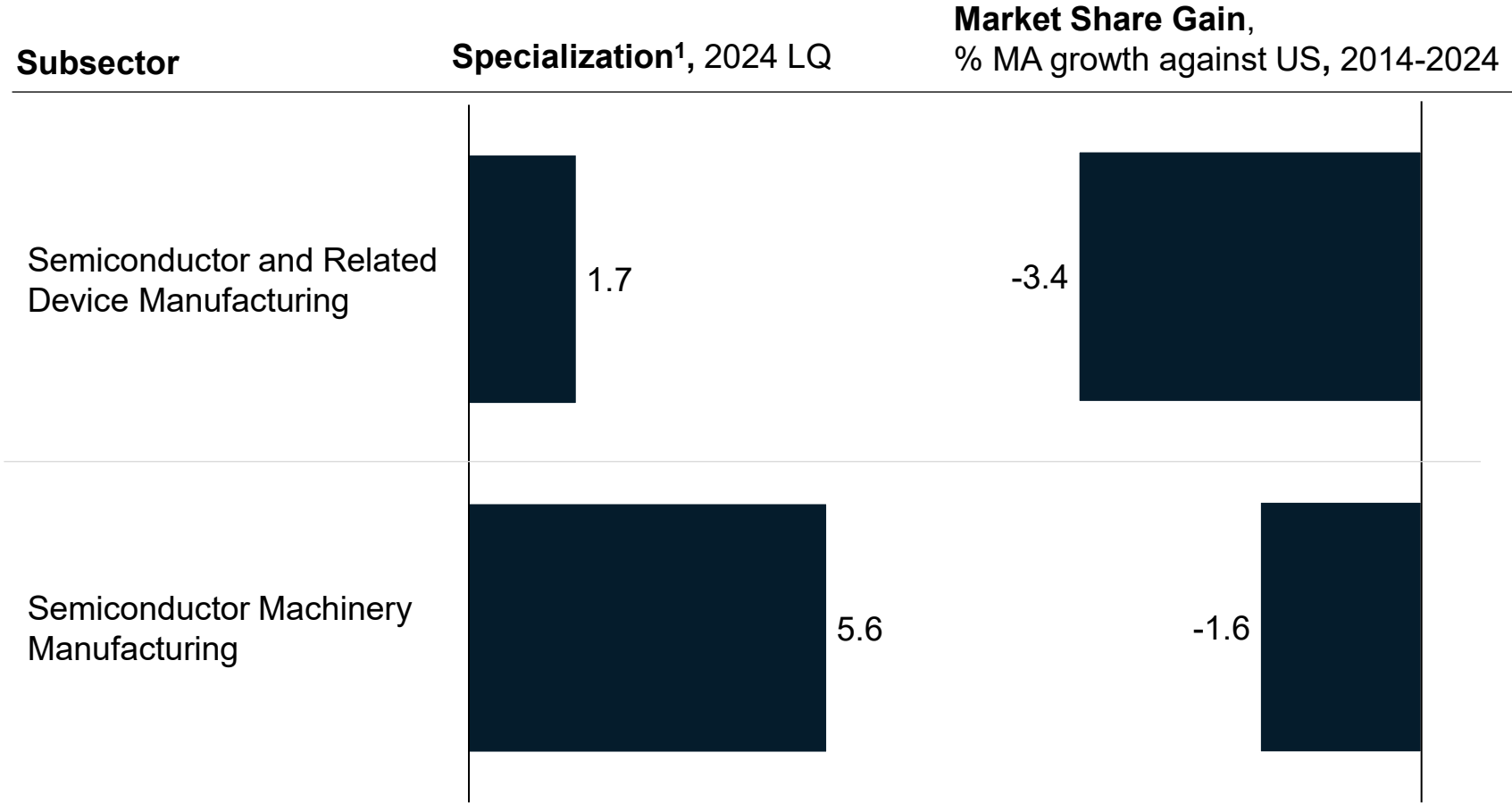
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- Semiconductor manufacturing employment is expected to remain positive over the next 10 years. US growth is expected to continue to outpace MA by 0.5%
- Semiconductor machinery manufacturing growth is expected to slow. The subsector is still expected to grow faster in MA than the US over the next 10 years

MA has lost more market share in both semiconductor sub-sectors

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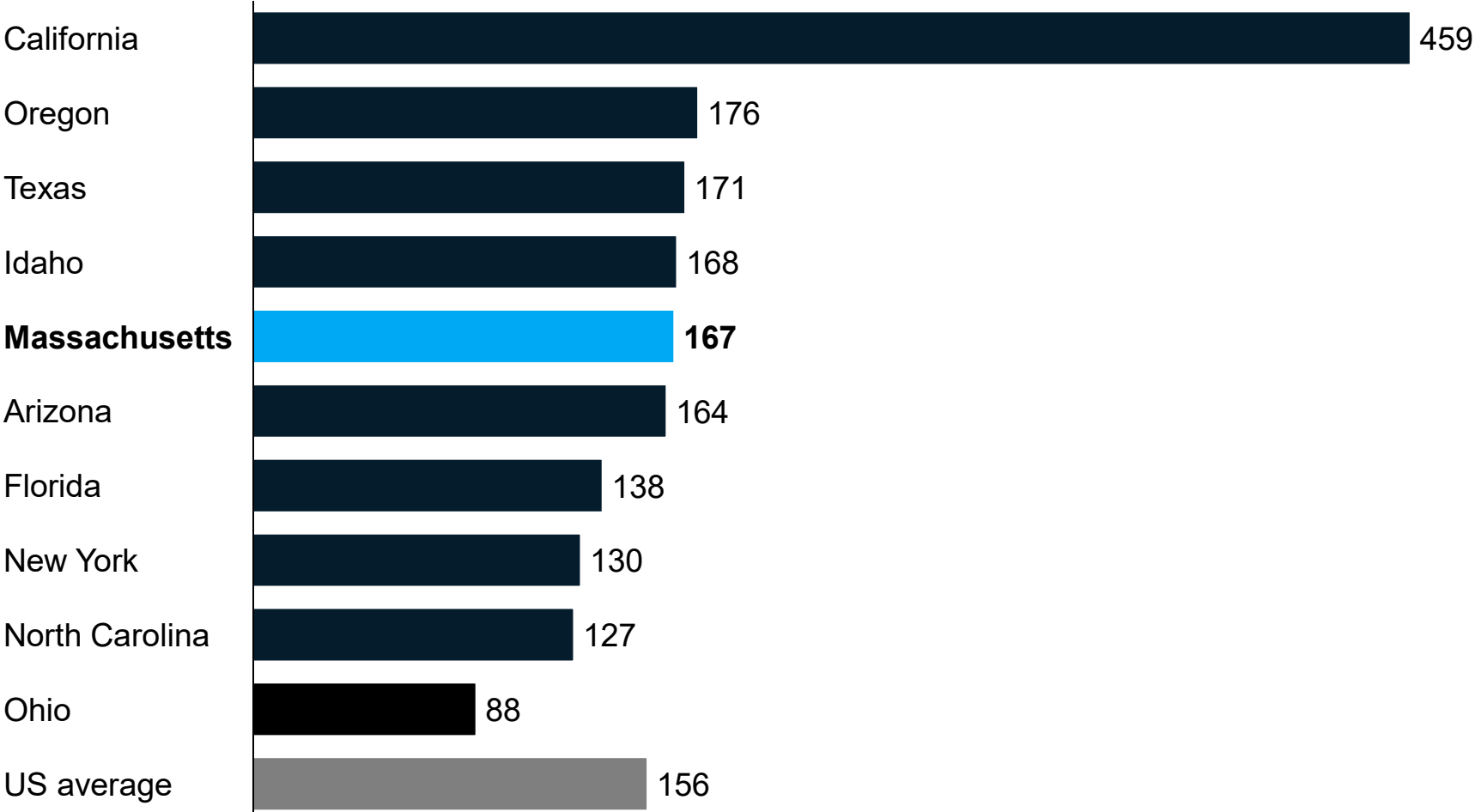
- Though MA’s semiconductor machinery manufacturing subsector currently has high specialization, it has lost 1.6% market share relative to the US
- MA has lost over twice as much market share in the semiconductor and related device manufacturing subsector, which is less specialized in the state

1. Specialization (LQ) is measured as the ratio of a sector’s share of employment in a region to that sector's share of employment in the US

MA has the 5th highest wages among top states for semiconductor employment, with CA leading by a wide margin

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Semiconductor wages by state, \$, Ths., 2024¹



- MA has the 15th highest wages nationally in the semiconductor sector. 5th highest among the top 10 states by semiconductor employment
- CA wages are over 2x larger than MA wages
- The states ranked immediately below CA (OR, TEX, ID) are above MA by a relatively close margin

1. 2024 Wages, Salaries, & Proprietor Earnings

Objectives for today

- Macro trends and dynamics
- **Talent supply and demand**
- Startup and investment landscape

MA is not producing enough graduates to fill open roles in some of the most in-demand occupations of the semiconductor sector

Preliminary

Top 15 occupations within MA's semiconductor sector¹

■ <50% Completions relative to Openings
 ■ 51-75% Completions relative to Openings
 ■ >75% Completions relative to Openings

Occupations	Openings, 2024, K	Completions ² , 2024	Typical entry level education
General and Operations Managers	9.12	9546.7	Bachelor's degree
Software Developers	4.36	4667.3	Bachelor's degree
First-Line Supervisors of Production and Operating Workers	1.29		High school diploma or equivalent
Miscellaneous Assemblers and Fabricators	1.28		High school diploma or equivalent
Inspectors, Testers, Sorters, Samplers, and Weighers	1.25		High school diploma or equivalent
Electrical, Electronic, and Electromechanical Assemblers	1.19		High school diploma or equivalent
Machinists	0.78		High school diploma or equivalent
Industrial Engineers	0.73	208.8	Bachelor's degree
Mechanical Engineers	0.70	828.1	Bachelor's degree
Industrial Machinery Mechanics	0.62		High school diploma or equivalent
Architectural and Engineering Managers	0.61	4414.1	Bachelor's degree
Electrical and Electronic Engineering Technologists and Technicians	0.39	105.8	Associate's degree
Electronics Engineers, Except Computer	0.34	469.0	Bachelor's degree
Computer Hardware Engineers	0.24	145.9	Bachelor's degree
Semiconductor Processing Technicians	0.15		High school diploma or equivalent

- 8 out of the top 15 in-demand occupations in the semiconductor sector in MA do not require a BA
- For many of the roles that do require a BA, MA is not graduating enough talent to fill open roles
- Management, engineering, and production occupations are the most in-demand types of occupations in the semiconductor sector

1. Based on 2024 employment in industry

2. To adjust for duplication, the number of completions within each degree program (CIP) was distributed to each corresponding occupation (SOC) typically requiring a four-year degree or higher by way of a weighted average based on current employment within occupations

MA universities produced ~12.5K semiconductor-related graduates in 2023, accounting for 8.7% of total completions in the state

Completions in semiconductor-related programs^{1,2} 2023

Top 15 MA universities. by number of completions

		% of total completions	Growth, 2018-23 CAGR
Northeastern University	2,883	22.9%	5.5%
Massachusetts Institute of Technology	1,547	12.3%	0.6%
Worcester Polytechnic Institute	1,329	10.6%	1.8%
University of Massachusetts-Lowell	1,061	8.4%	0.3%
Boston University	998	7.9%	1.1%
University of Massachusetts-Amherst	993	7.9%	2.3%
Harvard University	670	5.3%	4.4%
Tufts University	612	4.9%	3.5%
Wentworth Institute of Technology	354	2.8%	-1.3%
Berklee College of Music	292	2.3%	65.9%
University of Massachusetts-Dartmouth	206	1.6%	-3.4%
Western New England University	181	1.4%	-1.8%
Massachusetts Maritime Academy	162	1.3%	-3.0%
Franklin W Olin College of Engineering	85	0.7%	-0.2%
Springfield Technical Community College	79	0.6%	-3.2%
Total	12,570	8.7%	1.7%

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- Northeastern, MIT, WPI and UMass produce the most engineering, engineering tech. and physical science graduates in the state, accounting for over 50% of the state's total graduates in these program areas
- Completions in semiconductor-related programs has grown in 9 of the top 15 universities

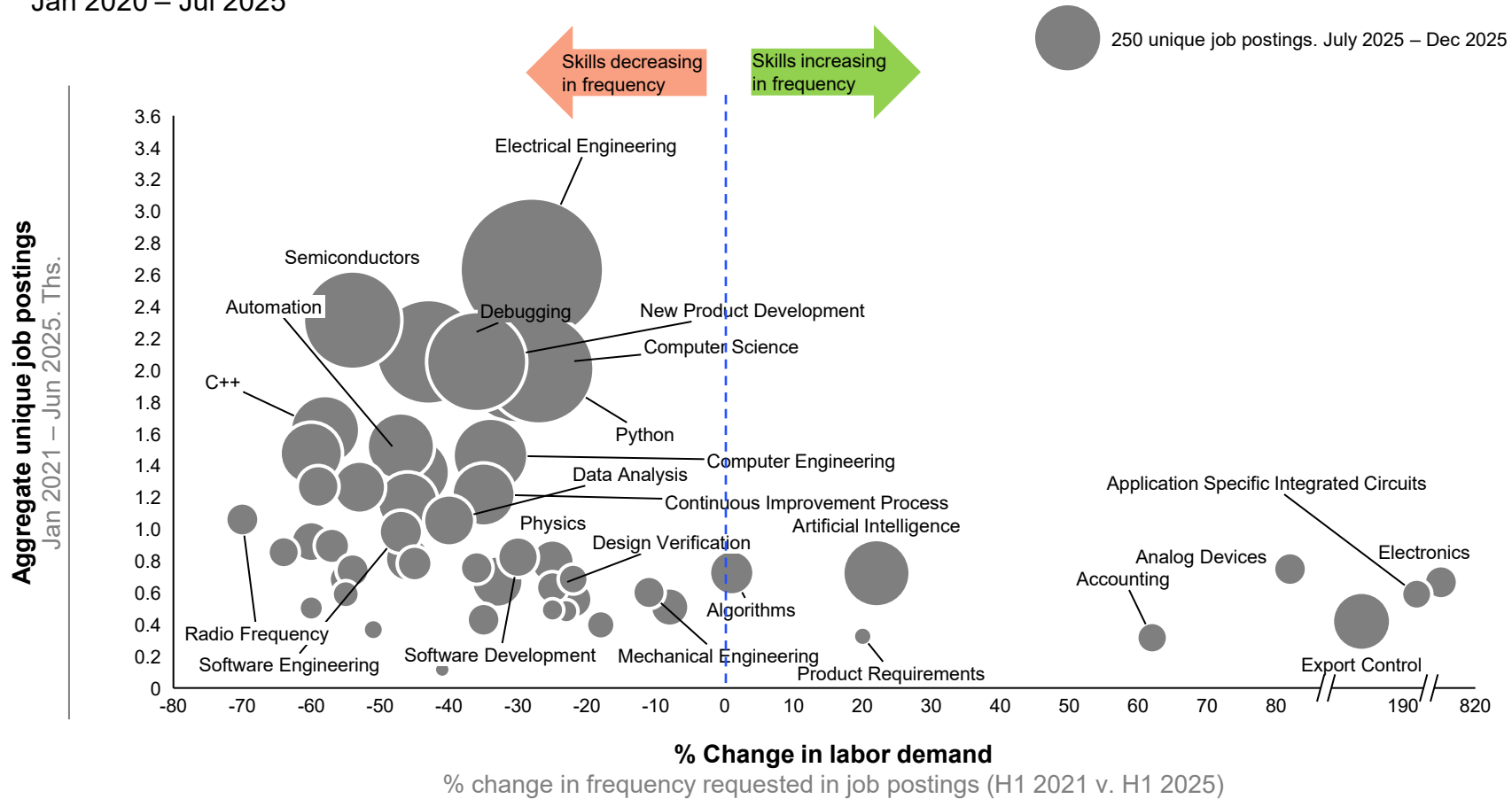
1. CIP codes: Engineering (14), Engineering/Engineering-related Technologies/Technicians (15), Physical Sciences (40); 2. All degree types; 3. Overall university retention rate, not program specific

Top hard skills requested in semiconductor jobs are related to computer programming and engineering

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Top 50 in-demand hard-skills¹ for MA employers in the semiconductor sector

Jan 2020 – Jul 2025



- Electrical engineering, semiconductors and computer science skills have been the most frequent in postings since 2021
- General computing and Engineering skills are also among the ones with the most postings in 2025
- Electronics, and applied specific integrated circuits skills have experienced the highest increase in demand. AI and machine learning skills also experienced increases in demand

1. Based on job postings filtered by Semiconductor NAICS in MA. Specialized, semiconductors, and certificate skills only (excludes common skills).

Over the past year, Analog Devices, Applied Material, and Intel have been seeking the most semiconductor mfg talent in MA

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MA companies	Job postings, Unique postings, July 2024 – July 2025	% of postings
Analog Devices	575	24.8%
Applied Materials	195	8.4%
Intel	171	7.4%
Skyworks	167	7.2%
AMD	164	7.1%
Axcelis Technologies	133	5.7%
Nvidia	115	5.0%
Microchip Technology	108	4.6%
Infineon Technologies	68	2.9%
Osi Optoelectronics	61	2.6%
Mei Rigging & Crating	54	2.3%
Skyworks Solutions	53	2.3%
Broadcom	51	2.2%
Qorvo	51	2.2%
Marvell Technology	46	2.0%

- 57 companies are looking for semiconductor manufacturing workers in MA, 34 of which had less than 10 job posting in the last year
- ~60% of the demand for talent in the semiconductor sector comes from the top 6 companies posting for jobs

Objectives for today

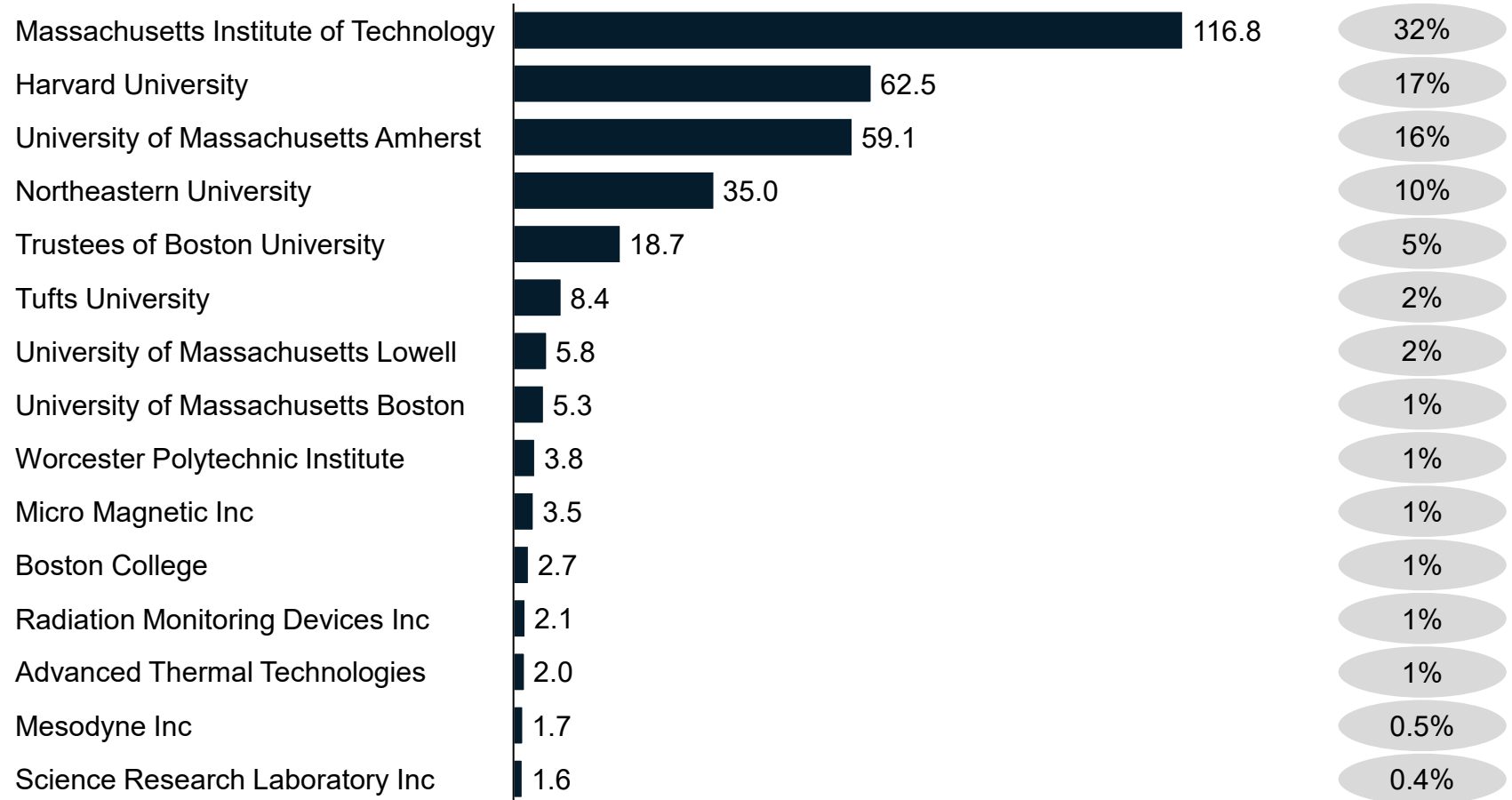
- Macro trends and dynamics
- Talent supply and demand
- **Startup and investment landscape**

MIT receives nearly 1/3 of total NSF funding for semiconductor R&D in the state; overall NSF funding for semiconductors has increased substantially since early 2023

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Semiconductor-related R&D funding from NSF, top 15 institutions

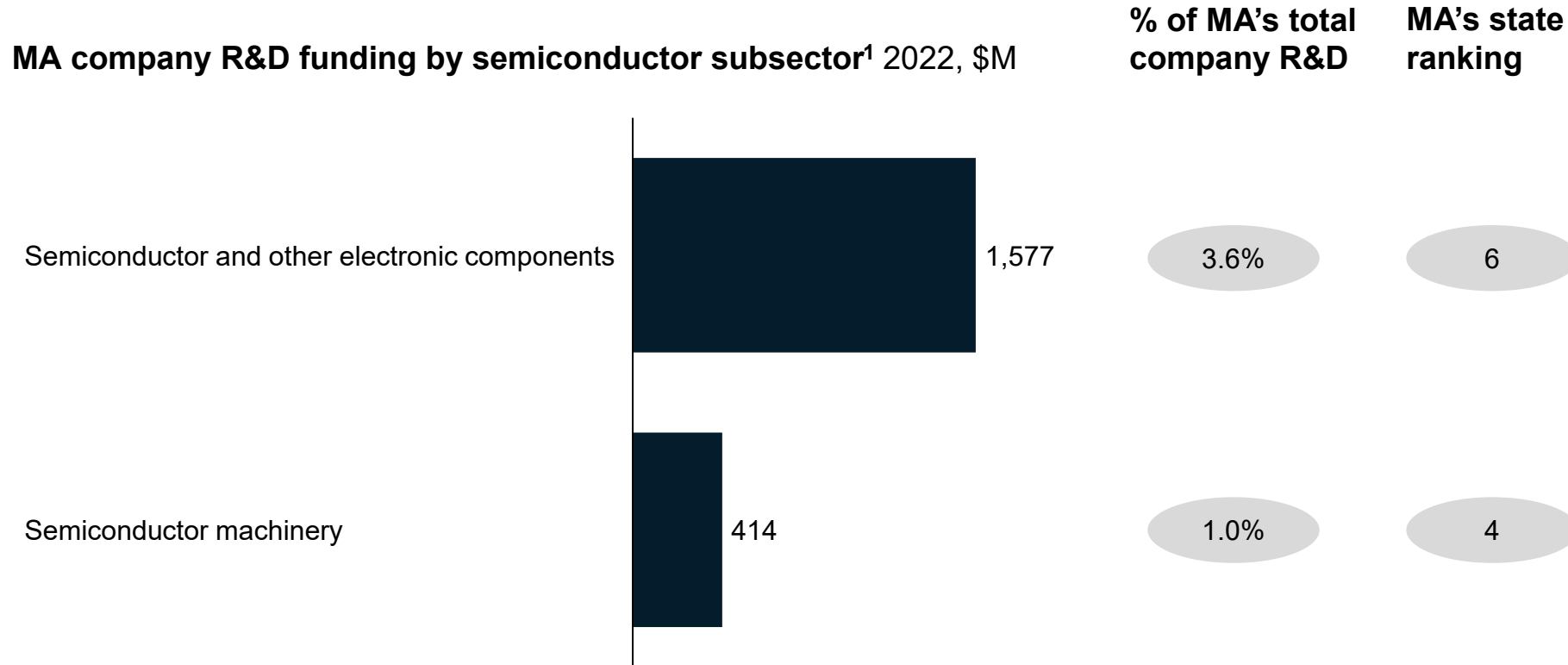
Active awards as of August 2025, \$M



- 101 MA institutions have \$370M in active grants for semiconductor-related R&D from the NSF (up from \$26M in early 2023)
- MIT received nearly a third of total semiconductor-related R&D funding from the NSF
- Nationally, there are over 10K active NSF awards for semiconductor R&D

MA semiconductor companies invested \$2.0B in R&D in 2022

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- Semiconductor company R&D only grew 2% since 2021, compared to 15% growth in company funding overall
- California leads in semiconductor and semiconductor machinery R&D, its companies in both industries invest over 12x more than MA companies
- Oregon, Arizona, and Texas rank after California in semiconductor business R&D nationally

1. Domestic R&D paid for and performed by the company, based on 6 and 4-digit NAICS codes

\$661M in venture capital funding has been invested in MA Semiconductors industry over the past 5 years

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MA Total VC investment by primary industry group, 2020-24, \$M

Primary Industry Group	Investment (\$M)	% of total VC in US
Pharmaceuticals and Biotechnology	44,832	31%
Software	16,903	4%
Healthcare Devices and Supplies	5,582	12%
Healthcare Technology Systems	5,311	11%
Commercial Products	5,068	9%
Commercial Services	4,915	5%
Exploration, Production and Refining	4,081	39%
Healthcare Services	3,424	5%
Agriculture	2,898	28%
Computer Hardware	2,727	8%
Energy Equipment	1,551	13%
Consumer Non-Durables	1,506	5%
Energy Services	1,196	14%
Commercial Transportation	831	11%
Consumer Durables	729	5%
IT Services	684	6%
Semiconductors	661	4%
Media	591	4%
Chemicals and Gases	503	9%
Metals, Minerals and Mining	495	19%

Higher than average share of investment (MA receives 8% of total US VC)

- Semiconductor VC investment ranks 17th out of 39 industry groups

Semiconductor exits over the past 5 years have been M&As

~25

Semiconductor startups active¹ in MA

0

IPOs in the past 5 years

14

M&A exits in the past 5 years

1. Active startups defined as: PE, VC, accelerator/incubator, or angel backed with business status: profitable, generating revenue, product development, stealth, or startup (excludes companies tagged as bankruptcy)

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Top recent exits by semiconductor startups, by valuation, 2020-2024

Company	Exit type	Exit date	Approx. valuation. \$M
HCS-Electronic Materials	M&A	2021	395.90
Vesper (Electronic Equipment and Instruments)	M&A	2022	160.0
Anokiwave	M&A	2024	93.7
Custom MMIC	M&A	2020	91.7
Jetcool	M&A	2024	53.0
Intrinsix	M&A	2021	33.1
Uniqarta	M&A	2021	26.5
Barry Industries	M&A	2021	20.8
Intrinsix	M&A	2023	3.8