Innovation Policy and High-Tech Sector Challenges

Aaron Institute for Economic Policy, Reichman University in collaboration with Startup Nation Central

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Outline: Main insights and policies

High-Tech impact on the economy

The sources for High-Tech resilience

Risks to mitigate today

Policy recommendations

Proposed plan for moving forwards

Main insights: High-Tech impact on the Israeli economy

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- **The contribution of the High-Tech sector to the Israeli economy** is exceptional in international comparison
- **The High-Tech sector is an essential** driver of the resilience in the Israeli economy: Growth, Current Account (BOP) surplus and Taxes: **including 2023-24**
- **The High-Tech sector is the main engine of advancing Israel into the ranks of top countries in GDP per capita**

The size and annual growth of the High-Tech sector enable economic and financial stability by reducing Debt-to-GDP Ratio and maintaining surplus in Current Account

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Main insights: The sources for High-Tech resilience

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- The High-Tech sector is diversified by **many companies and fields**
- **The High-Tech sector is globally competitive**
- **There is a high supply of potential employees with High-Teck skills – with more to come**
- **The High-Tech sector is attractive to investors – both in times of War and in Normal times!**

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Main insights: High-Tech risk sources – Today

- **Decrease in economic and financial stability driven by:** war, increase in debt to GDP ratio, Judiciary reform, internal friction, dysfunctional public sector, down graded sovereign credit, potential international boycott and reduced air traffic
  - 2023-2024 shows decrease in start up activity during 2023 – **risk**
  - The share of High-Tech employees in reserve service is twice higher than others – **High risk**
  - No decrease in the presence of Multinational Companies (MNC) – **surprising stability**
  - Decrease in employment in growth occupations – **High risk**
- Will AI disrupt and decrease Israeli's High-Tech share and GDP growth? Conflicting views exist. According to a review of economic literature, the answer is "NO"
- Innovation Authority **budget** is at low and declining level: **does it align with Israel's comparative advantage?**

Policy recommendations to tackle immediate risks

- **Sustain macro economic and financial stability by** following the Aaron Institute's Macro Economic Recommendations
- **Increase the attractiveness of MNC** activity through a competitive tax system
- Implement size and efficiency of military service by **limiting annual reserve service duration,** and increasing regular army service (ultra-Orthodox men and others)
- Develop and manage an **Effective Innovation Economy Policy**, to address new challenges

Economy Wide Innovation Policy

based on Qualitative Technological Edge measurement

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Vision

Sustaining the High-Tech Sector as platform for Economic Growth

Transitioning from a Dual Economy to an Inclusive one

by Enhancing Labor Productivity

Across All Sectors through Innovation and Digitization

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Follow the USA, EU, OECD Innovation Policy Strategy

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Focus on: Skills, Innovation in the Business Sector, E- Government

Identify: challenges, opportunities, strategic priorities

Set: Strategy, Measurable Targets, Plans, Budget to achieve targets, Transparent monitoring system to measure progress towards the targets

Policy recommendations to enhance Economy Wide Innovation

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High-Tech Skills: implement the Perlamutter Committee recommendations: 3.5% annual growth rate of employed in tech occupations, focus on female, ethnic groups, periphery

Enhance Innovation in the Business Sector: Target is to sustain the recent annual productivity growth rate of 2% over all business fields, by multiple reforms

E-government: improve public sector productivity by full digital transformation

- **Promote Ease of Doing Business** (tax system, payment system, judiciary system, transportation systems, employment and human capital)
- **Investment in Infrastructure:** Provide reliable and fast connection, and access to essential national innovation infrastructures (Computing, 5G connectivity, Optical fiber full coverage, Cloud, Quantum, Big Data) ; Strengthen general infrastructures (Energy, Public Transport)

Proposed plan for moving forwards – main topics

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- What are the **main High-Tech developments** and their macro economic implications?
- **Brain Drain**: research the immigration of highly skilled Israelis (with the Innovation Authority using classified data)
- What are High Tech related government policies for **2026 budget reforms?**
- **Reevaluate the Innovation Policy strategy:**
  - What is the best way to measure **Q**ualitative **T**echnological **E**dge to guide policies to support economic growth, stability and security? (with Mind Israel)
- Execute the **High-Tech Skills policy program** (Perlamutter Committee)
- Establish **measurements and set targets** for Digital Strategy for Public sector
- Improve the **data on firm's R&D activity** (joint with CBS, Innovation Authority, SNC)

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Thanks!

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High-Tech impact on the Israeli economy

Israel leads in the high-tech share of Employment and GDP
The share of High-Tech sector in Employment in Israel is similar to Texas

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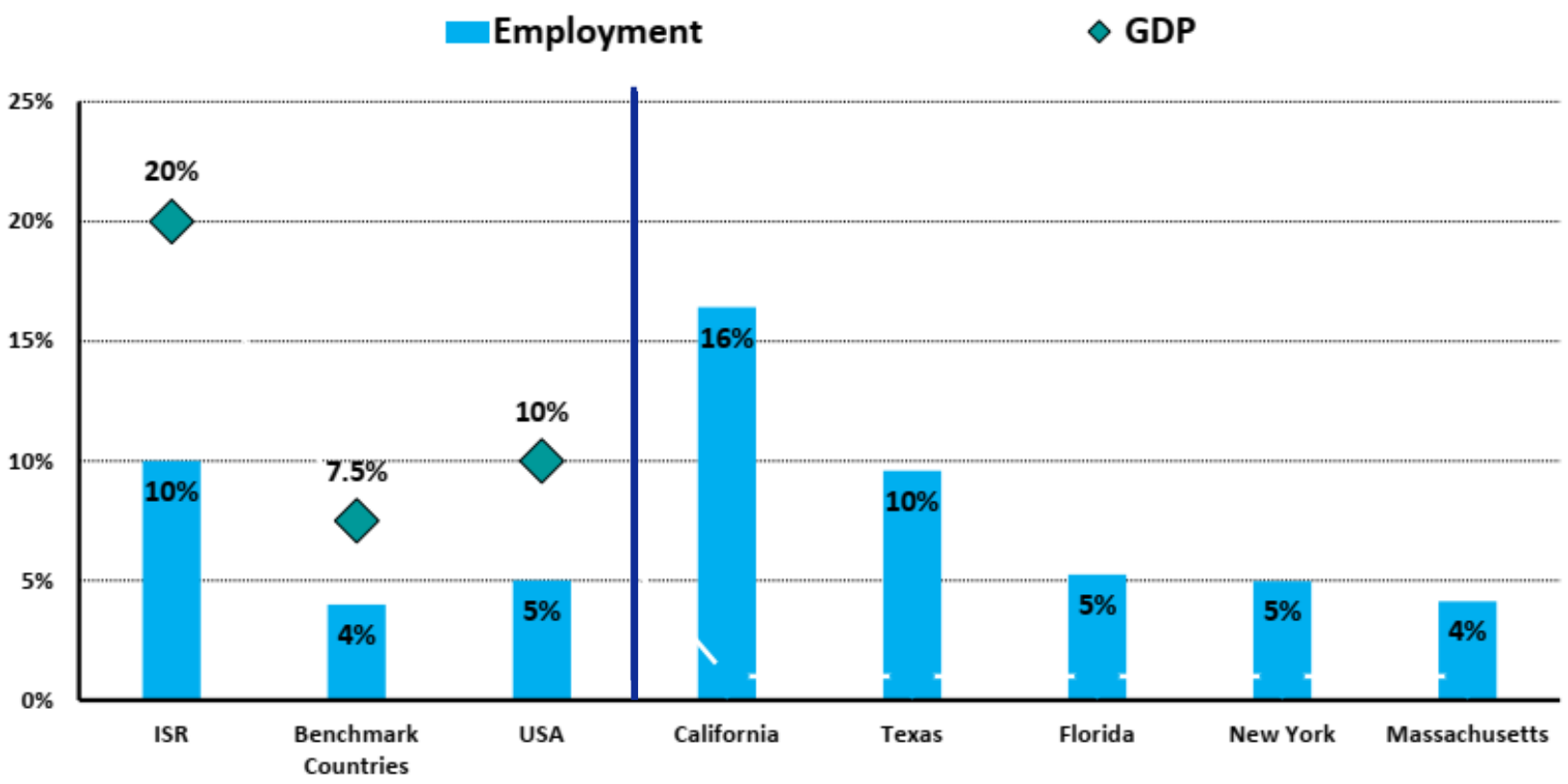
Share of High-Tech sector in Employment and GDP, 2022



Benchmark countries: Austria, Denmark, Finland, The Netherlands, Sweden.
Source: Aaron Institute analysis of CBS, BLS, OCED data.

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High-Tech sector is a growth platform for the Israeli economy: In War and Normal time

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- During 2017 – 2022 and 2023 years, the High-Tech sector GDP growth **(9.5% and 5.1%)** contributed **40%** of the total GDP annual growth (4.2% and 2.0%).
- **Due to: Increase in the share of full-scale profitable Israeli companies, Increase in average productivity**
- During War the High-Tech sector holds the economy: in 2024 H1 High-Tech GDP growth is **1.8%** when the overall economy growth is **-1.3%**

The contribution of High-Tech Sector to growth

Growth Components	War: H1 2024 vs. H1 2023	Annual Growth Rate 2007-2022
High-tech GDP per employee	3.5%*	2.0%
High-tech employment	-1.7%	4.4%
High-tech GDP	1.8%	6.4%
Total GDP	-1.3%	3.9%

Source: Aaron Institute analysis of CBS data.

High-tech is 53% of exports - main source of stable surplus in Current Account (4% of GDP since 2005)

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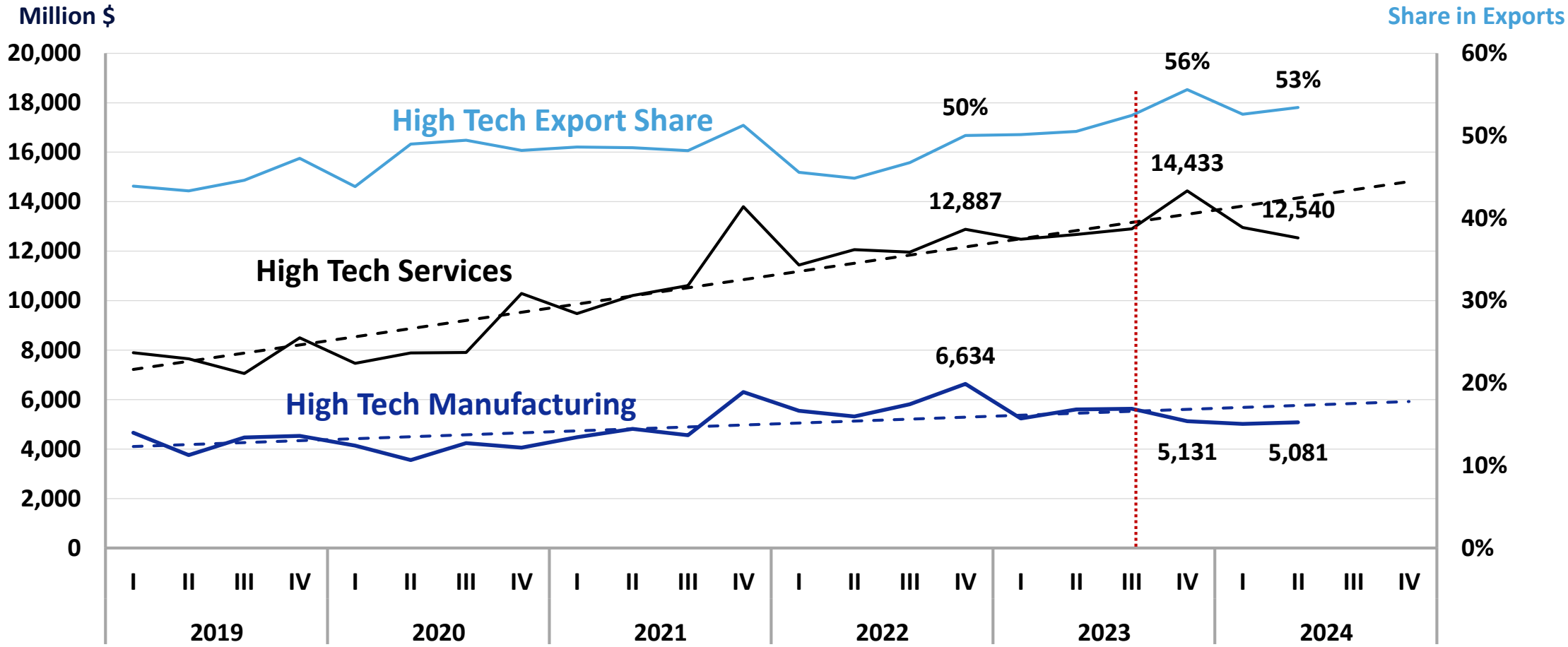
High-Tech Export: Total, manufacturing and services



Source: CBS

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High-tech sector contributes 25% to taxes

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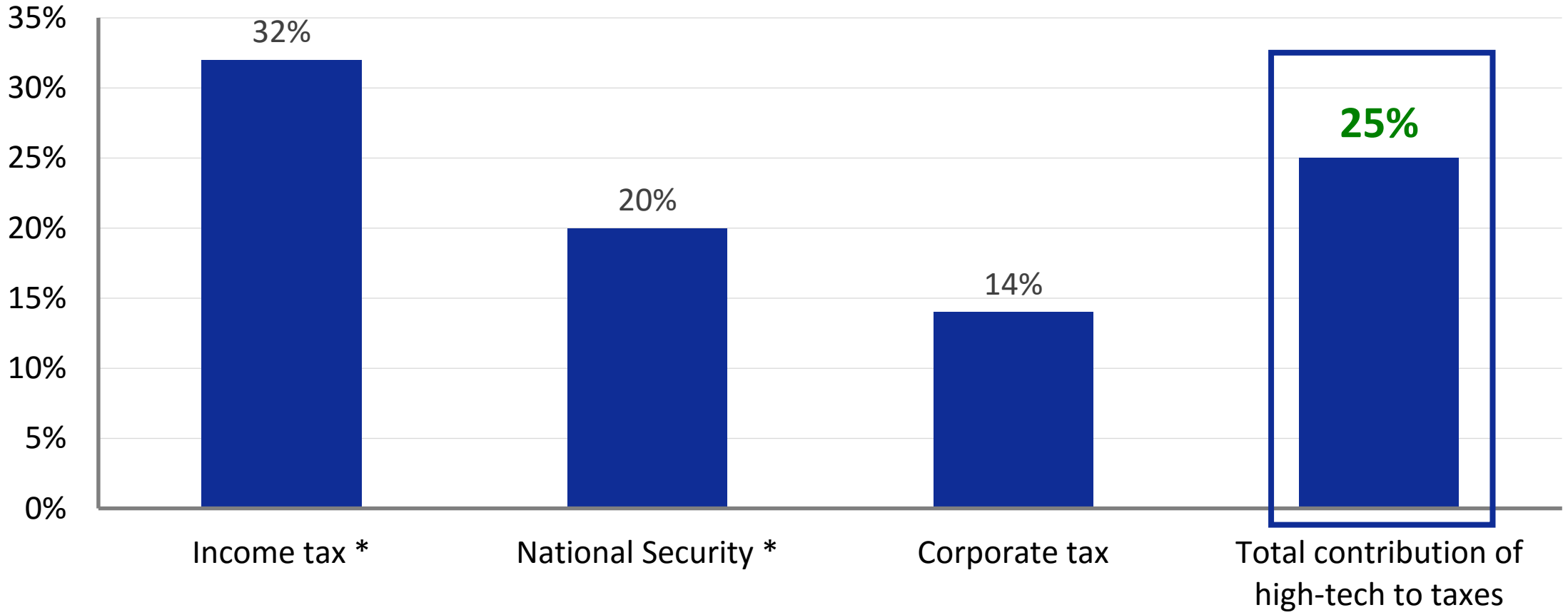
The total contribution of high-tech sector to: income tax, national security, corporate taxes, 2020



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Source: Ministry of Finance. * Employees only. Without VAT

The reduction of GDP per capita gap (10%) between 2017-2023, is mainly due to the growth of the High-Tech sector*

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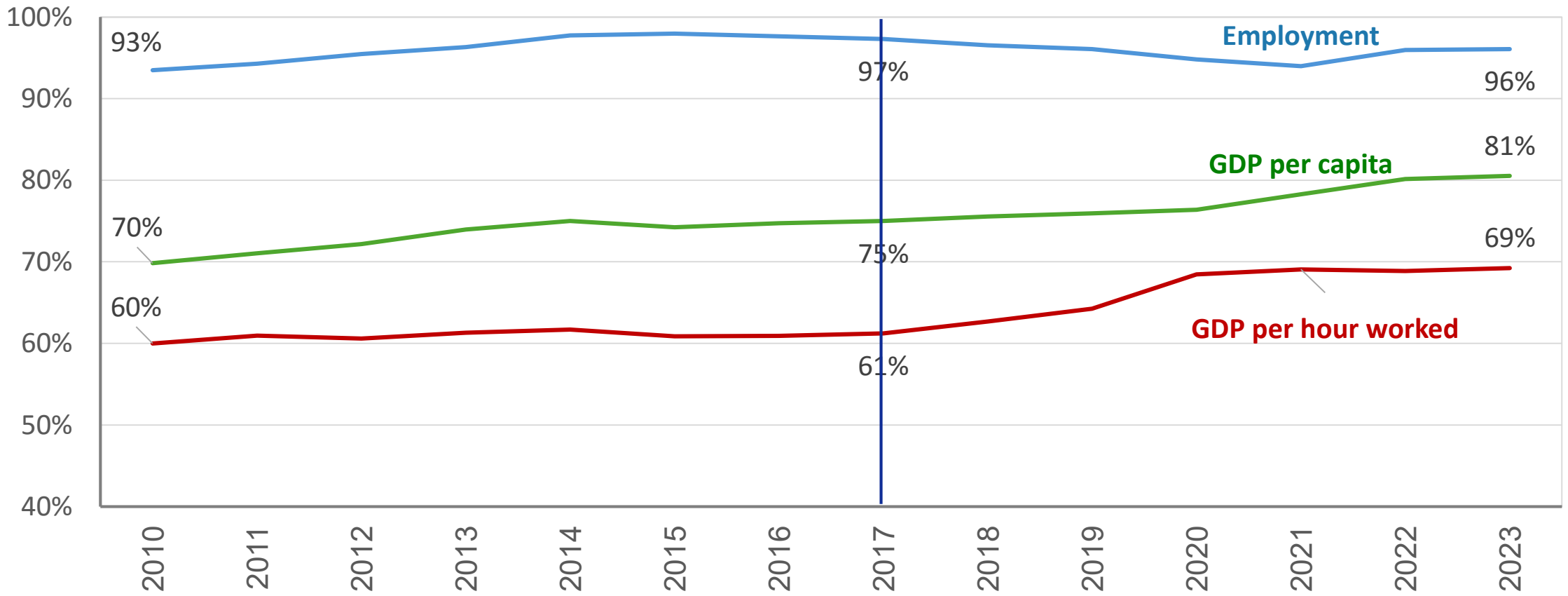
Employment rate ratio, GDP per capita ratio, Labor Productivity ratio Israel to Benchmark countries, 2010-2023



Benchmark countries: Austria, Denmark, Finland, The Netherlands, Sweden.

* During these years, the productivity of Financial sector grew 13.5% annually and it contributed additional 10% to the growth of total GDP

Source: Aaron Institute analysis to OECD data. **2015 prices PPP.**

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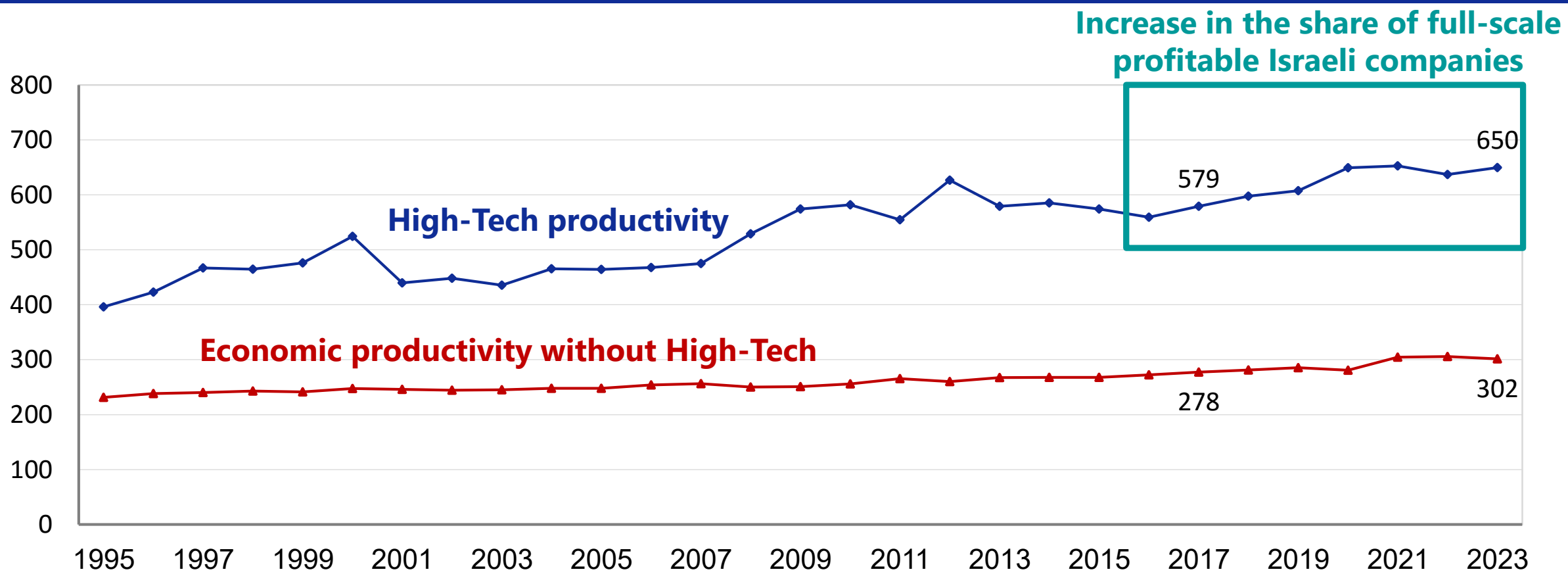
Dual Economy: Productivity in High-Tech is 2.2 times higher than in the economy without High-Tech

*Annual productivity growth rate 2017-2023: **2%** in High Tech and **1.4%** Economy without High-Tech*

GDP per worker, by sector, 1995-2023 (Thousand NIS, 2015 prices)



Source: Aaron Institute analysis to CBS data. 2015 prices.

High Tech Productivity in Israel is similar to benchmark countries and 38% below USA

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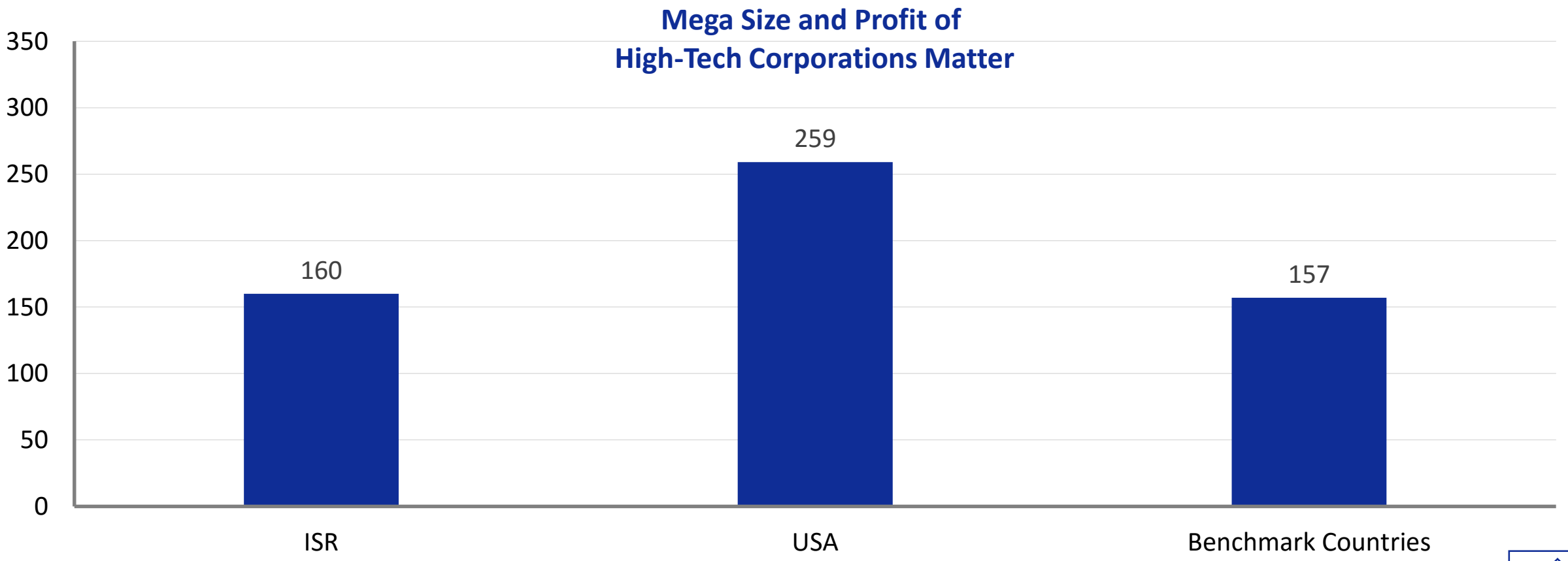
Value Added per Worker, High-Tech sector, 2021, Thousand $ PPP 2015 prices



Benchmark countries: Austria, Denmark, Finland, The Netherlands, Sweden.
Source: Aaron Institute analysis of OCED data. Ages of 15+

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The sources for High-Tech resilience

High-Tech is diversified by many types of companies: Start ups are only 9%, while Defense 12%, and MNCs 33% of employees

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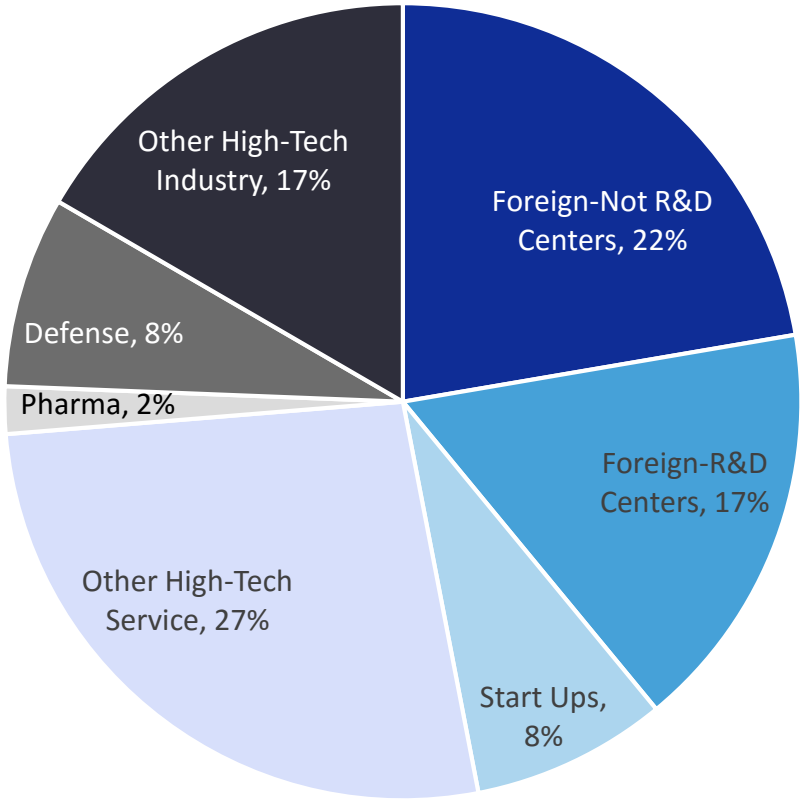
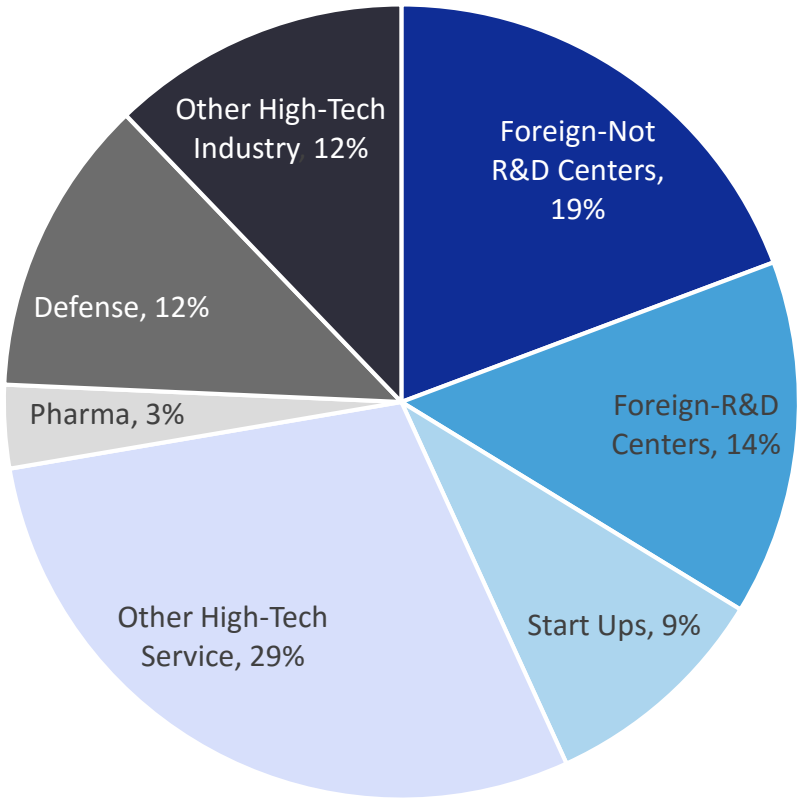
High-Tech GDP Distribution by firm type, 2023



High-Tech Employment Distribution by firm type, 2023



Source: CBS

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High-Tech is diversified by many fields: but ~60% of VC funding concentrated in three sectors

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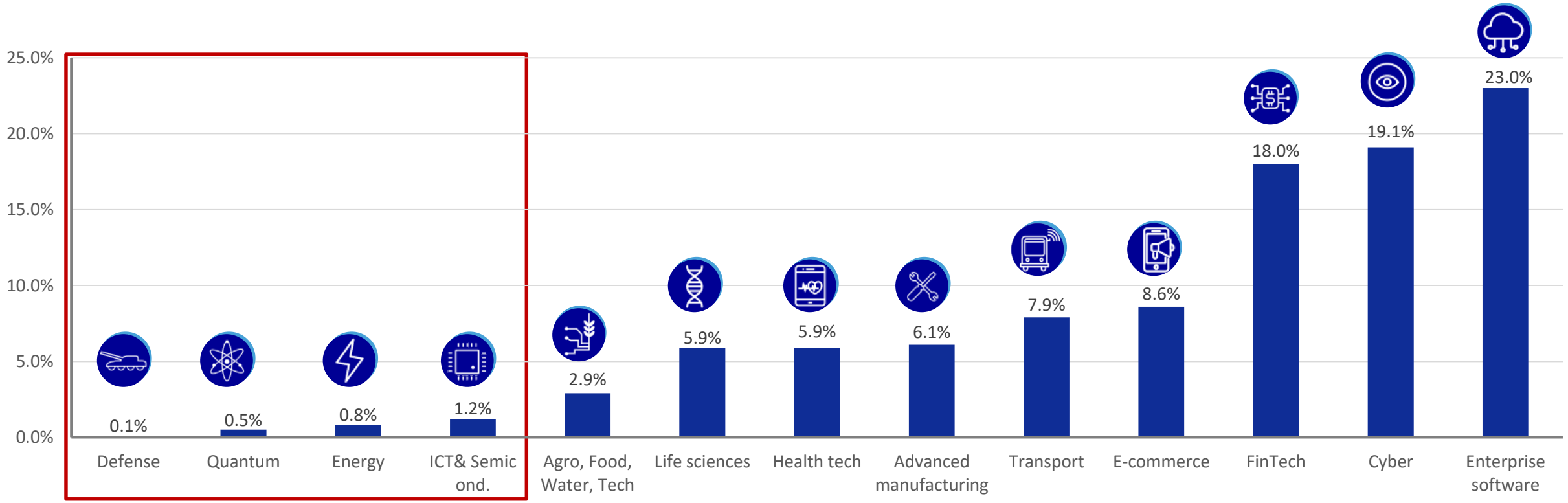
Percent of VC funding by field, 2023



Source: the Innovation Authority

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80% to 100% of the High-Tech sector output is exported

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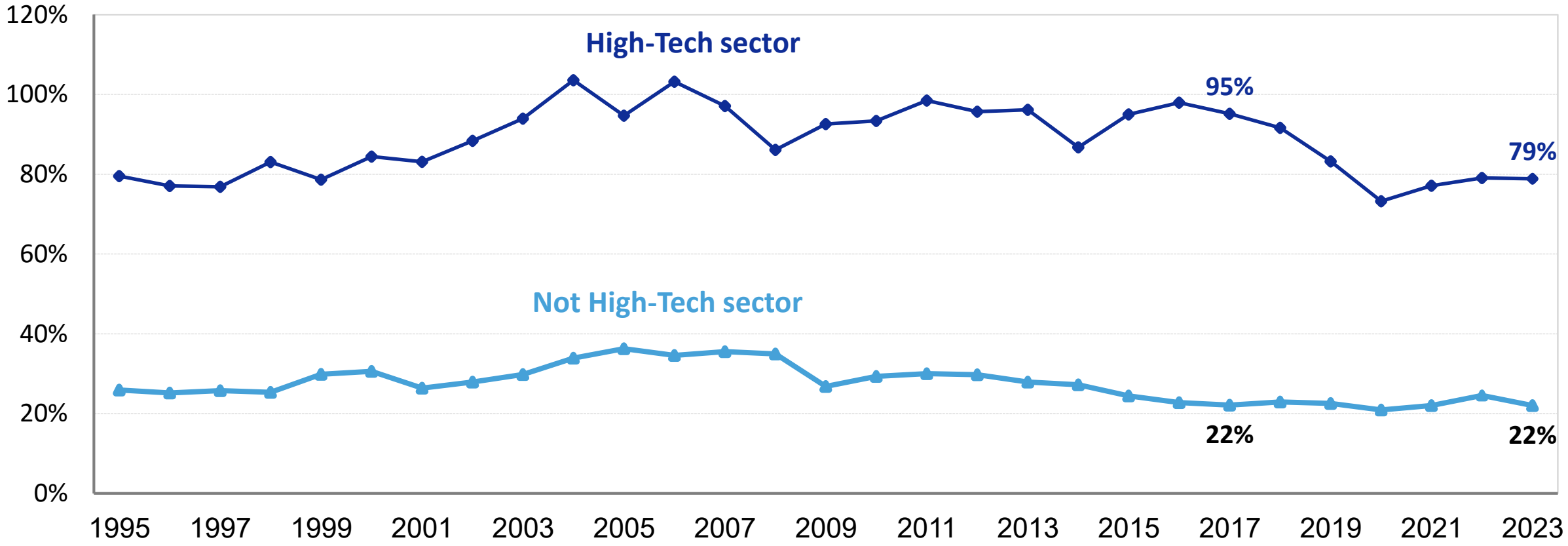
Share of Exported output by sector, 1995-2023



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Source: Aaron Institute analysis to CBS data

Israel is worldwide leader in relative share of ICT specialists in the total workforce: Main source for strength!

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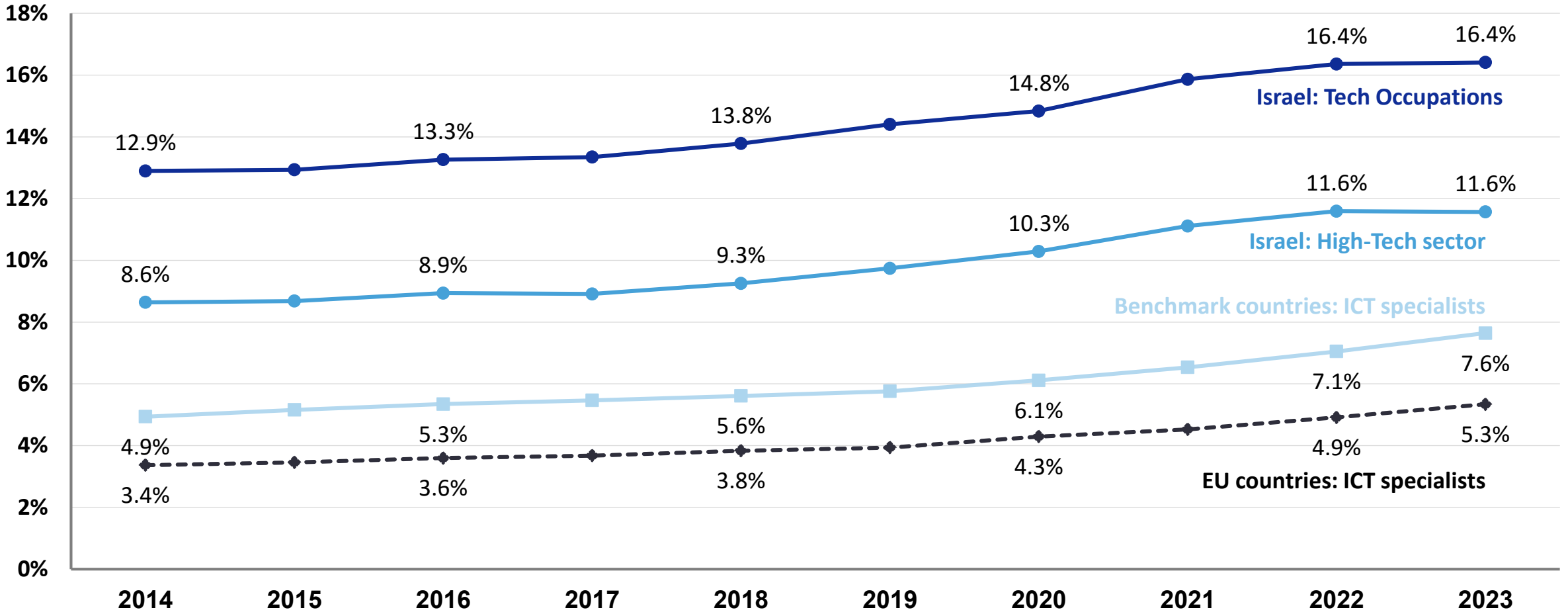
Relative share of ICT / High Tech specialists in the total workforce



Benchmark countries: Austria, Denmark, Finland, The Netherlands, Sweden.
Source: CBS (Aged 25-64), Eurostat (Aged 15-75)

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Share of R&D Employees in High Tech sector in Israel is almost equal to USA

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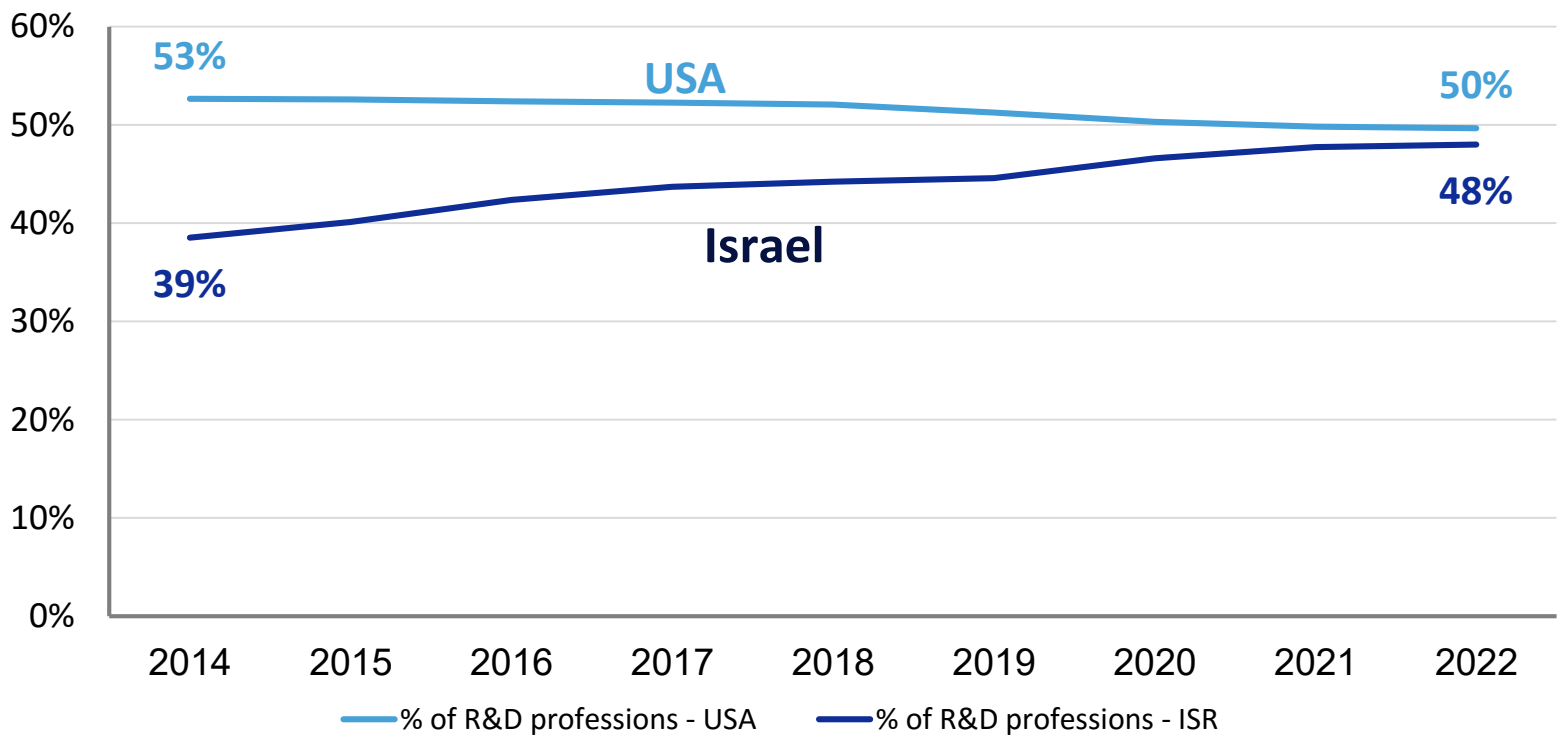
Share of R&D Employees in High Tech sector , ISR vs USA



Occupation cluster	USA- Annual Growth Rate 2017-2022	ISR-Annual Growth Rate 2017-2022
R&D Employees	2.4%	9.4%
Growth	4.6%	5.7%
High-Tech Employment	3.5%	7.4%

Next step:
1. Update to 2024,
2. Follow the USA Most Demanded Professions in last 5 years, by R&D and Growth cluster

Source: CBS, BLS

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Israel should continue to lead: Perlamutter Committee Target: sustain annual growth rate of employed in tech occupations at 3.5%-4.0%; focus on female, ethnic groups, periphery

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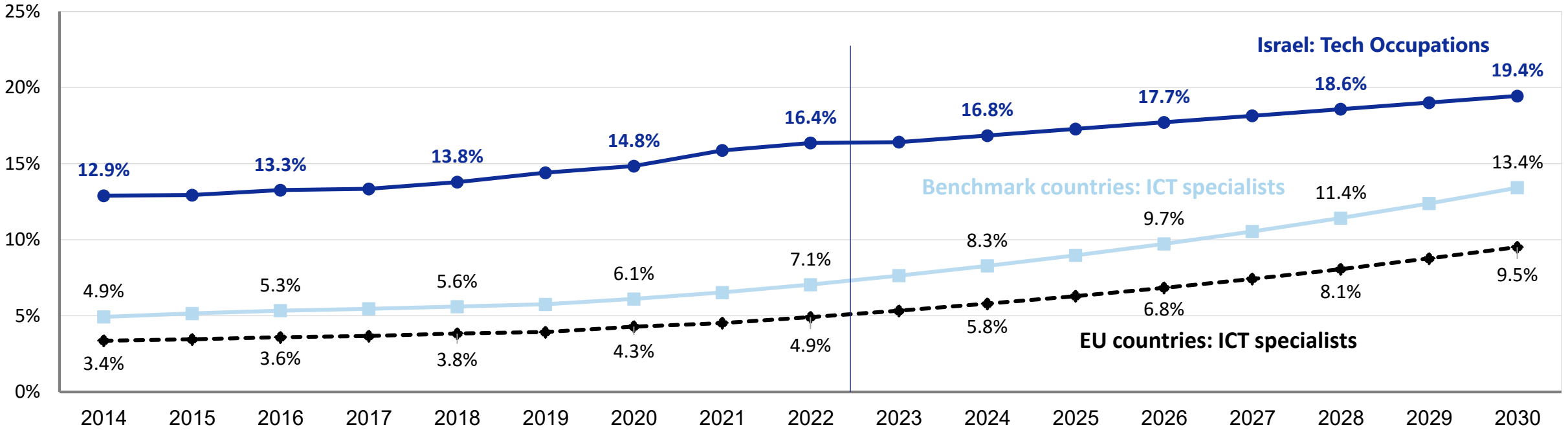
Relative share of ICT / High Tech specialists in the total workforce – 2030 Projections



Benchmark countries: Austria, Denmark, Finland, The Netherlands, Sweden
Source: CBS (Aged 25-64), Eurostat (Aged 15-75)

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VC foreign Investments in Israeli High Tech was exceptionally high from Q1 2021 to Q2 2022. 2023-2024 VC Investment are at 2019-2020 level.
Israel is among the World top 5 High Tech hubs using VC investments criteria *

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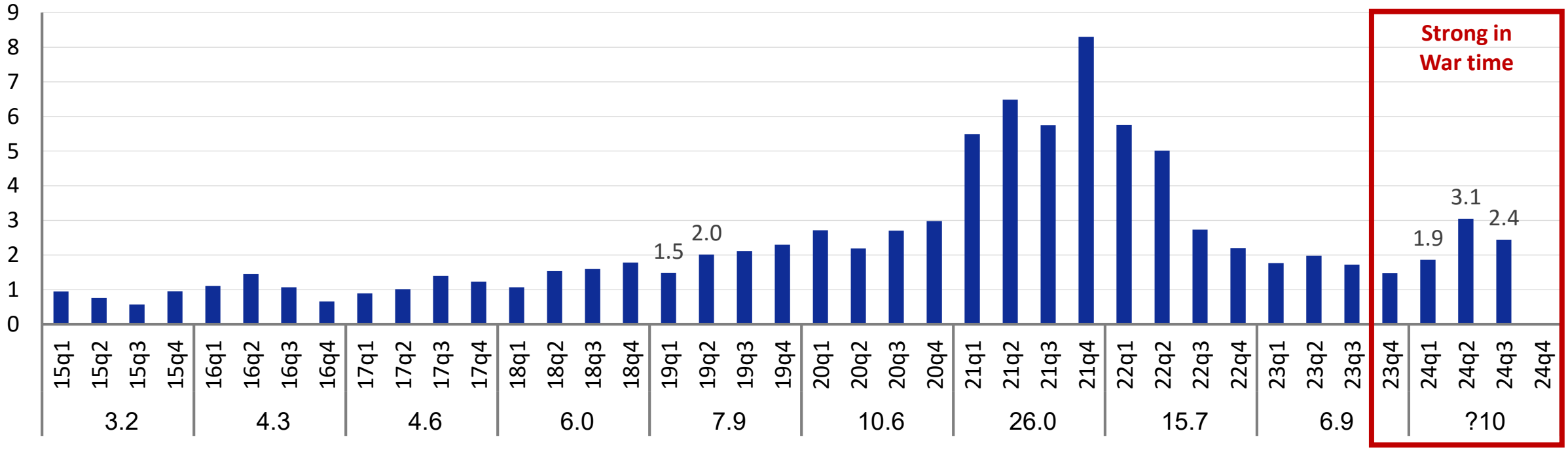
As long as Talent stays – Investors will come

Israel High-Tech Capital Investments, Capital Raised, $b



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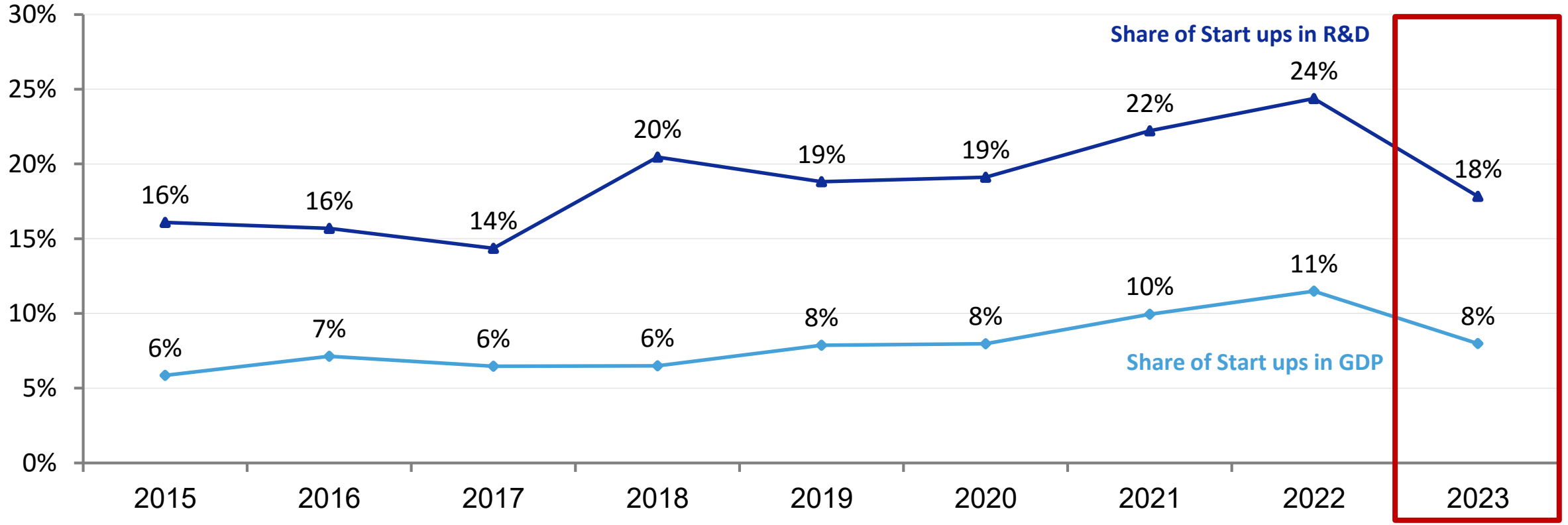
Source: IVC, * the Innovation Authority

High-Tech risk sources - today

Decrease in Start-up companies share in spending on R&D and in GDP in 2023

Share of Start ups in R&D and GDP, 2015-2023



Source: Aaron Institute analysis of CBS and SNC data

The percentage of reservists in the high-tech sector (4.8%) is twice as high as in other sectors of the economy (2.4%). Since October 7th , average reserve service lasts 145 days

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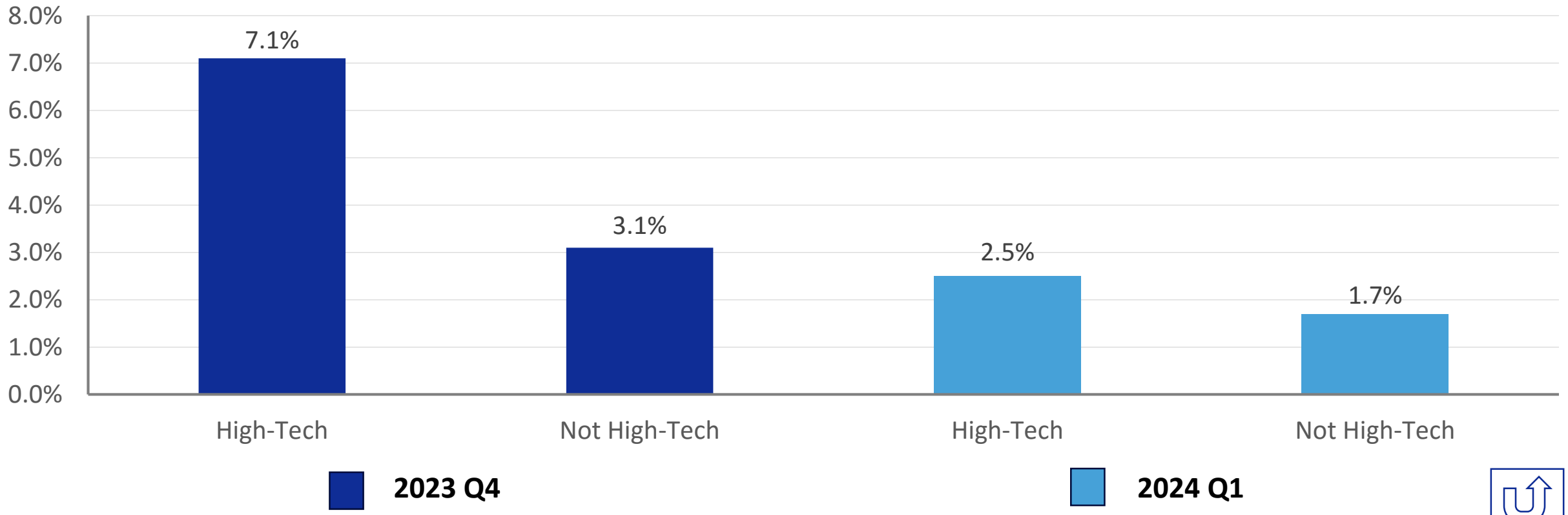
The percentage of those serving in the reserves, by economic sector



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Source: CBS

Meetings with: Google, Intel, Microsoft, Palo Alto, Cisco, Facebook - Summary of findings

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- At this stage there is no decline in MNC output and R&D activity and hiring
- Due to the geopolitical situation:
  - MNCs do not allow the expansion of activity through the establishment of production plants
  - MNCs are concerned regarding potential brain drain of employees

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In H1 2024 compared to H1 2023
The high-tech sector experienced a 1.7% decline in Employment

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- **Product & Operations employees experienced a significant drop of 9% - risk to the growth of full-scale Israeli companies**
- **R&D employees experienced an increase of 5.8%**

High-Tech Employment, by occupation cluster

Occupation cluster	H1 2024 vs. H1 2023	Annual Growth Rate 2022-2023	Annual Growth Rate 2017-2022
R&D Employees	5.8%	3.2%	9.4%
Product	-9.2%	-2.8%	9.3%
Operations	-8.6%	5.9%	3.3%
All High-tech Employees	-1.7%	2.6%	7.4%

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Economic literature review main insights

Daron Acemoglu

AI is a positive force when workers complement it in creating new tasks rather than being substituted.

David Autor

Unlike previous waves of automation that displaced middle-skill workers, **AI could play a unique role in rebuilding the middle class** by complementing human expertise and expanding access to higher-skilled tasks

Source: Acemoglu etal 2024, Autor 2024 , Eloundou et al., 2023, **Acemoglu, Autor and Johnson 2023**, **Acemoglu etal 2022**, FT, World Economic Forum, IMF, OECD

Economic literature review main insights

- **In High Tech Sector AI has enhanced labor productivity through an increased demand for advanced technical expertise while automating routine task and enabling employees to focus on higher value work:**
  - **Automation of routine tasks enhances efficiency and productivity by** automating routine tasks (IT support, data entry etc), allowing professionals to focus on higher-value work
  - **AI increases demand for high skilled tech employees** (such as machine learning engineers, cybersecurity and cloud computing experts, data scientist, and ethical AI specialists) and **"Tech Track" education**
  - **AI highlights the importance of soft skills** (such as complex problem-solving and creativity)
- **Public policy should focus on fostering Human-AI-Complementarity path leveraging AI to augment human capabilities**
- **These insights were confirmed by Eyal Waldman (co-founder of Mellanox Technologies, which was sold to Nvidia in 2019 (US$6.9 billion))**

Source: Acemoglu etal 2024, Autor 2024 , Eloundou et al., 2023, **Acemoglu, Autor and Johnson 2023**, **Acemoglu etal 2022**, FT, World Economic Forum, IMF, OECD

Tech Track education

High School	Mathematics, Physics, Computer Science, Engineering, English
Bachelor's Degree	Computer Science, Mathematics, Electrical Engineering, Data Science, Cognitive Science, Physics. **Key Courses:** Programming (Python, Java, C++), Data Structures and Algorithms, Mathematics and Statistics, Machine Learning, Robotics, Data Science.
Master's Degree	Artificial Intelligence, Machine Learning, Data Science, Computer Science with a Focus on AI. **Key Courses:** Advanced Machine Learning, Deep Learning, Natural Language Processing (NLP), Reinforcement Learning, AI Ethics and Policies, Robotics and Computer Vision.
PhD	Deep Learning, Reinforcement Learning, NLP, Robotics, AI Ethics.

Policy Recommendations – Skills

- **Invest in AI Education at All Levels**
  - Introduce programs to strengthen AI needed skills at all educational levels, from primary school through university, to build a future workforce that is AI-literate. Expand AI-focused curricula in high schools and provide university students with opportunities to pursue degrees in AI and related fields such as data science, robotics, and computer vision**.** Examples Finland.
- **Upskill the Existing Workforce**
  - Launch nationwide reskilling and upskilling programs to train the current workforce in AI and digital technologies. This can be done through partnerships with tech companies, offering short-term certification programs. Examples Finland.
- **Attract and Retain Global AI Talent:** Implement policies to attract top global AI talent by offering visa incentives, research funding, and favorable working conditions for AI researchers, engineers, and data scientists
  - Attract Global AI Talent with English-Taught Programs
  - Retain Talents
  - Create AI Talent Hubs and Research Centers

Source: AI4EU consortium, European AI Act, The National Artificial Intelligence Research Institutes, Germany's Industry 4.0 initiative , Education — FCAI

Policy Recommendations – Business

- Incentivize **AI Development and Adoption** of human complementary AI technology through tax incentives, grants, and funding programs to businesses that adopt and develop AI technologies.
- **Promote AI Adoption in Traditional Industries** Encourage businesses across all sectors, especially traditional industries like manufacturing and agriculture to adopt AI technologies. Example: Germany's Industry 4.0 initiative
  - **Encourage AI-Focused Corporate R&D**
- Support **AI Startups and SMEs** through dedicated AI accelerators, access to government contracts, and funding opportunities, particularly for AI.
- Foster **Data Sharing Between Businesses:** The government should create a framework for data-sharing among businesses to facilitate the development of AI. By allowing companies to share non-sensitive data, AI systems can improve in accuracy and effectiveness, benefitting the economy as a whole. Example: the AI4EU platform facilitates in the EU
  - The Innovation Authority offered companies and research institutions financial assistance in creation stages of databases in Hebrew and or spoken Arabic, on the condition that these databases were shared widely with the research and development community for NLP.
- Promote **Public-Private Partnerships for AI Innovation** to foster collaboration between the government, academia, and private companies. This can accelerate AI innovation while ensuring that advancements align with public interest and are deployed responsibly. For example, the AI4EU consortium in the EU.

Policy Recommendations – Infrastructure

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- Develop **National AI Cloud infrastructure** is essential for enabling businesses and research institutions to process vast datasets, which are critical for AI development. Example: National Artificial Intelligence Research Resource in the USA
- Promote full coverage of **High-Speed Data Networks** (such as 5G) to ensure efficient AI deployment, particularly in sectors like autonomous vehicles, smart cities, and healthcare.
- Create **AI Testing and Certification Centers**: Establish AI testing centers where companies can trial their AI technologies in a controlled environment, ensuring that AI solutions meet national safety, security, and ethical standards before being deployed widely. Example: Germany's AI Quality and Testing Hub
- Incentivize **Green AI Data Centers** energy-efficient data centers optimized for AI processing to minimize environmental impact. Examples: tax efficient data centers in Norway, European Code of Conduct for Data Centres
- Build a **National AI Supercomputer** that provides businesses, research institutions, and startups with access to advanced computational power necessary for developing cutting-edge AI technologies.
  - NVIDIA has developed Israel's first supercomputer ISRAEL-1. While the state is investing in the development of the supercomputer, NVIDIA states that more investments are needed for research in infrastructure and human capital.

Source: Germany's AI Quality and Testing Hub, National Artificial Intelligence Research Resource, in Norway, European Code of Conduct for Data Centres , Nvidia Sr. Director of AI Research: "Israel must invest more in AI to reclaim a leade | Ctech (calcalistech.com)

Policy Recommendations – Institutions

- Implement a **National AI Research Program -** to lead cutting-edge research in AI and foster collaboration between universities, private companies, and public institutions. It would be similar to the National Artificial Intelligence Research Institutes in the US.
- Implement a **National AI Regulatory Program** to oversee the responsible development and deployment of AI technologies. It would be similar to the **European AI Act** model. Examples for regulations in other countries
- Implement **AI Ethics Guidelines and Data Privacy Laws** to govern the use of AI technologies. It should also include strict data privacy protections and anti-bias measures to prevent misuse of AI technologies, particularly in areas such as facial recognition and surveillance.
- Strengthen **Labor Institutions with AI-Related Retraining** to ensure that AI technology complements rather than displaces workers. Example: **Germany's Industry 4.0 initiative**
- Improve **Regulatory Clarity and Simplification**: to reduce bureaucratic delays and make it easier for businesses, particularly startups and small to medium-sized enterprises (SMEs), to operate. This could include streamlining the process for obtaining licenses and permits, ensuring faster turnaround times, and enhancing transparency in regulatory decisions. **Example:** Denmark consistently ranks high in regulatory efficiency (GII) due to its focus on reducing administrative burdens for businesses.

Source: AI4EU consortium, European AI Act, The National Artificial Intelligence Research Institutes, Germany's Industry 4.0 initiative

From 2017 to 2022 - decrease of 10%-30% in per start up company Innovation Authority support

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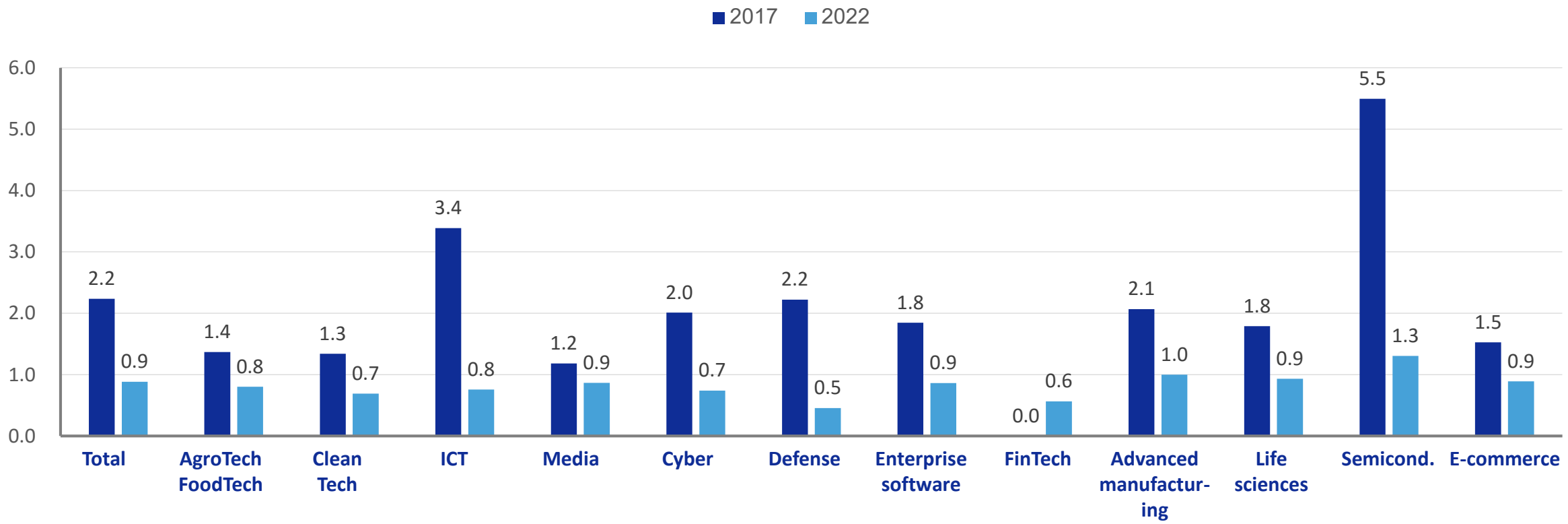
Innovation Authority per start up company support, 2017 and 2022 (Million Nis)



Source: CBS

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Policy recommendations to tackle immediate risks

Policy recommendations to tackle immediate risks*

Increase the attractiveness of MNC activity through a competitive tax system

- Provide certainty in granting capital gains **tax exemption to a foreign investors**:
  - Change in legislation a situation whereby granting a tax exemption to a foreign investor does not apply if the investor has a permanent establishment in Israel or if the activity is not defined as capital.
- Make it easier for small companies to merge (M&A) with larger companies to continue to grow
  - **Tax deferral upon merger**
- Create tax certainty for foreign MNC
  - Establish a **green tax path for MNC** whose operations are not based in Israel

Source: Ministry of Finance.

Digital Transformation Policy

Digital Transformation for Increased Productivity

Digitization of the Public Sector

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The challenge: Low labor productivity

- Primarily in the public sector
- Due to a digital lag in all economic production factors

Levers of change

- **Measurable quantitative goals**
  - Promoting a digital transformation in the public sector that will be measured by efficiency gains for both service providers and customers
- **Suggested destination**
  - Targeting a minimum 25% improvement in working hours for service providers and customers
  - Measuring saved time and providing incentives for shorter schedules
- Promotion and implementation of programs
  - Promoting and implementing digital transformation programs in government offices and regulators

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Sectorial findings 2021*

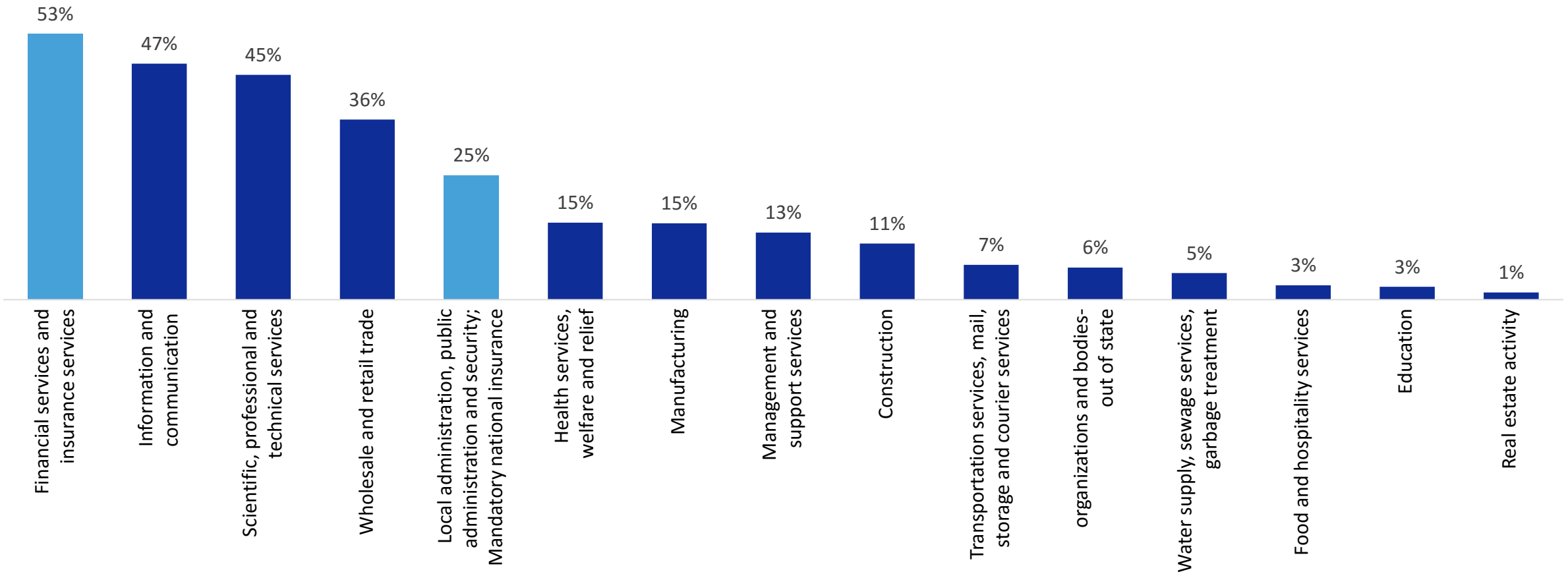
Digitization of the Public Sector

	Growth rates 2017–2021				
Economic sector	**Sectoral product per working hour 2021**	**Working hours in the sector**	**Sector productivity per working hour**	**Sectoral product**	**The weight of the sector in total working hours 2021**
Hi-tech	237	7.6%	0.6%	8.2%	**10.3%**
Manufacturing (without hi-tech)	136	-3.1%	4.6%	1.4%	**7.1%**
Information and communication services (without hi-tech)	181	-1.0%	0.2%	-0.8%	**1.2%**
Financial services and insurance services	260	2.9%	4.7%	**7.8%**	3.4%
Management and support services	124	-1.5%	2.3%	0.8%	**3.8%**
Local administration, public administration and security; Mandatory national insurance	83	3.6%	-2.0%	**1.5%**	**11.8%**

*GDP and sectoral GDP in millions of NIS 2021.
Source: processing of the CBS personnel survey data (Eckstein and others, 2023)

The annual ICT investment rate of total fixed assets by economic sector, average 2017-2021 – Low in the Public Sector

Digitization of the Public Sector



Source: processing of the CBS personnel survey data (Eckstein and others, 2023)

Labor productivity is negatively affected by the gap in ICT capital per capita

Digitization of the Public Sector

	ICT capital per capita
Israel	$440
Benchmark countries	$543

Investment in digital transformation will support the reduction of productivity gaps

Digitization of the Public Sector

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The correlation between digital transformation and product per person

Digital transformation index	**0.006***
Employment rates	**0.624****
Total capital (public and private) per capita	**0.425*****
constant	**5.897*****
No. of observations	**27**
R squared	**0.826**

*p<0.1, **p<0.05, ***p<0.01

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Follow the USA, EU, OECD Innovation Policy Strategy

GII: 80 Indicators,
Less Than Half (37) linked to Innovation – 14 Inputs, 23 Outputs,
Only 22 (6 inputs, 16 outputs)recommended for Innovation Policy

Category	GII	GII-Innovation		
		Total	Inputs	Outputs
Institutions	7	1	**6**	**16**
Human capital and research	12	5		
Infrastructure	10	4		
Market sophistication	10	4		
Business sophistication	15	10		
Knowledge and technology outputs	14	9		
Creative outputs	12	4		
Total	**80**	**37**		

Recommended input indicators to improve: ICT access, Government Online, Academic-Industry Knowledge Exchange

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GII – Selected input indicators, DTF

Indicator	ISR	BNC	USA	KOR	SGP	CHE	DEU
ICT access	54	70	55	79	100	71	64
Government's Online Service	39	85	87	100	92	59	37
University-industry R&D collaboration	No quantitative measure						
Total GERD, % GDP	100	53	61	88	31	56	56
GERD performed by business, % GDP	100	40	52	77	22	43	42
GERD financed by abroad, % GDP	100	57	43	2	17	33	41
Venture capital investors, deals/bn PPP$ GDP	100	30	42	11	100	65	21

BNC – Benchmark countries, KOR – Korea, SGP – Singapore, CHE – Switzerland, DUE – Germany

Source: Aaron Institute processes of World Intellectual Property Organization (WIPO), GII and OECD data 2022.

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Recommended output indicators to improve: ICT use, Online E-participation, "High-Tech matriculation" skills, High-Tech degree skills

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GII – Selected output indicators, DTF

Category	Indicator	ISR	BNC	USA	KOR	SGP	CHE	DEU
Infrastructure	ICT use	74	89	85	95	64	97	73
	Online E-participation	31	85	100	100	94	77	40
High-Tech Skills	PISA scales in reading, Math and Science	40	64	59	76	100	61	63
	Graduates in science and engineering, %	18	50	20	70	98	48	100
	Researchers, FTE/mn pop.	100	80	55	100	84	64	62
	Research talent, % in businesses	100	79	88	100	64	59	74
	Knowledge-intensive employment, %	75	77	73	60	94	79	71

BNC – Benchmark countries, KOR – Korea, SGP – Singapore, CHE – Switzerland, DUE – Germany

Source: Aaron Institute processes of World Intellectual Property Organization (WIPO), GII and OECD data 2022.

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Recommended output indicators to improve: Academic-Industry Knowledge Exchange, Innovation in the Business Sector

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GII – Selected output indicators, DTF

Category	Indicator	ISR	BNC	USA	KOR	SGP	CHE	DEU
Knowledge & Technology	Scientific and technical articles/bn PPP$ GDP	55	72	18	38	32	78	32
	Patents by origin/bn PPP$ GDP	33	80	100	100	24	100	100
	Patent familles / bn PPP$ GDP	67	66	53	94	46	81	67
	PCT patents by origin/bn PPP$ GDP	100	83	51	100	52	100	71
Business	Venture capital recipients, deals/bn PPP$ GDP	100	33	100	5	100	54	29
	Joint venture/strategic alliance deals/bn PPP$ GDP	91	44	75	13	71	58	18
	Production and export complexity	71	75	78	90	89	92	90
	High-tech exports, % total trade	73	57	64	99	100	54	71
	ICT services exports, % total trade	100	44	17	8	20	17	16

BNC – Benchmark countries, KOR – Korea, SGP – Singapore, CHE – Switzerland, DUE – Germany

Source: Aaron Institute processes of World Intellectual Property Organization (WIPO), GII and OECD data 2022.

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High Tech sector and Innovation Economy Policy recommendations

High Tech Skills - implementation of Perlamutter Committee advisory team recommendations

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- Increase the share of people employed in **tech occupations** from 14.8% to 20% in 2035
- Increase the share of **high-tech degree graduates** from 10% to 15% in 2028
- Increase the share of 1-2 year **vocational and technical training** – **set target 40% of cohort**
- Increase the share of those eligible for **high-tech matriculation** from 11% to 17% in 2028
- Increase the share of students in the top quarter of **performance in PISA** (Meizav) Math - – to be at least as good as Benchmark countries in 2028
- Improve **the basic Digital Skills** of students and workers – to be at least as good as Benchmark countries in 2028
- Improve the **AI Skills** of students and workers - to be at least as good as Benchmark countries in 2028

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Enhance Innovation in the Business Sector

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Adjust the Innovation Authority budget and Develop investment channels to:

- Increase R&D activity in the defense field through Start-up companies, Technological incubators - **set targets**
- Strengthen University-Industry R&D collaboration to increase the number of joint Start-up companies, patents, publications - **set targets**
- Increase support to start ups that have the potential to become full scale Tech companies
- Increase business companies Tech up-take (% of companies using Cloud, AI, or Big Data) – **set targets be at least as good as Benchmark countries**
- Support SMEs to reach at least a basic level of digital intensity – **set targets be at least as good as Benchmark countries**
- Privatize parts of defense companies to increase productivity and scale

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* Aaron institute research proposal was submitted to Innovation Authority

Zero Innovation Authority support for security, low support for cyber and semiconductors, significant support in the field of life sciences, a significant increase in support of agricultural technology and food technology.
Do the Investments of Israel allow to maintain a global technological frontier?

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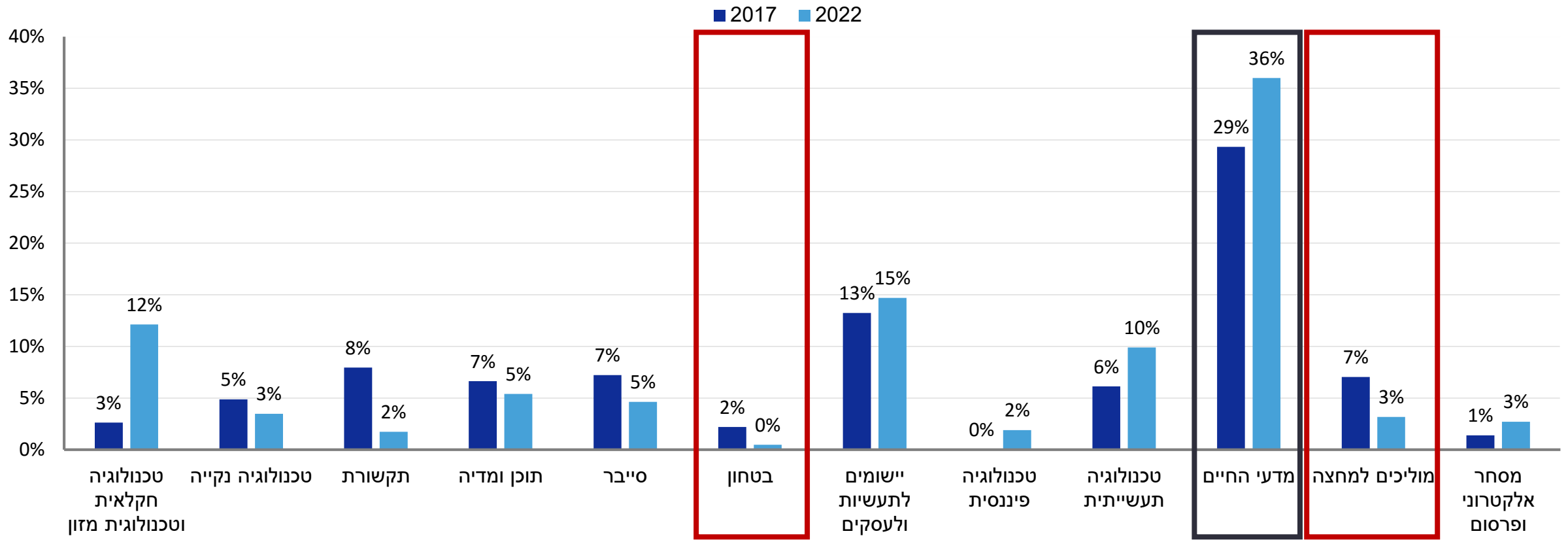
Distribution of Innovation Authority support of Start-Ups, 2017, 2022



Source: CBS

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Product per employee: 322 thousand NIS per worker. This is only 50% of the product per worker in the hi-tech sector (650 thousand NIS per worker)

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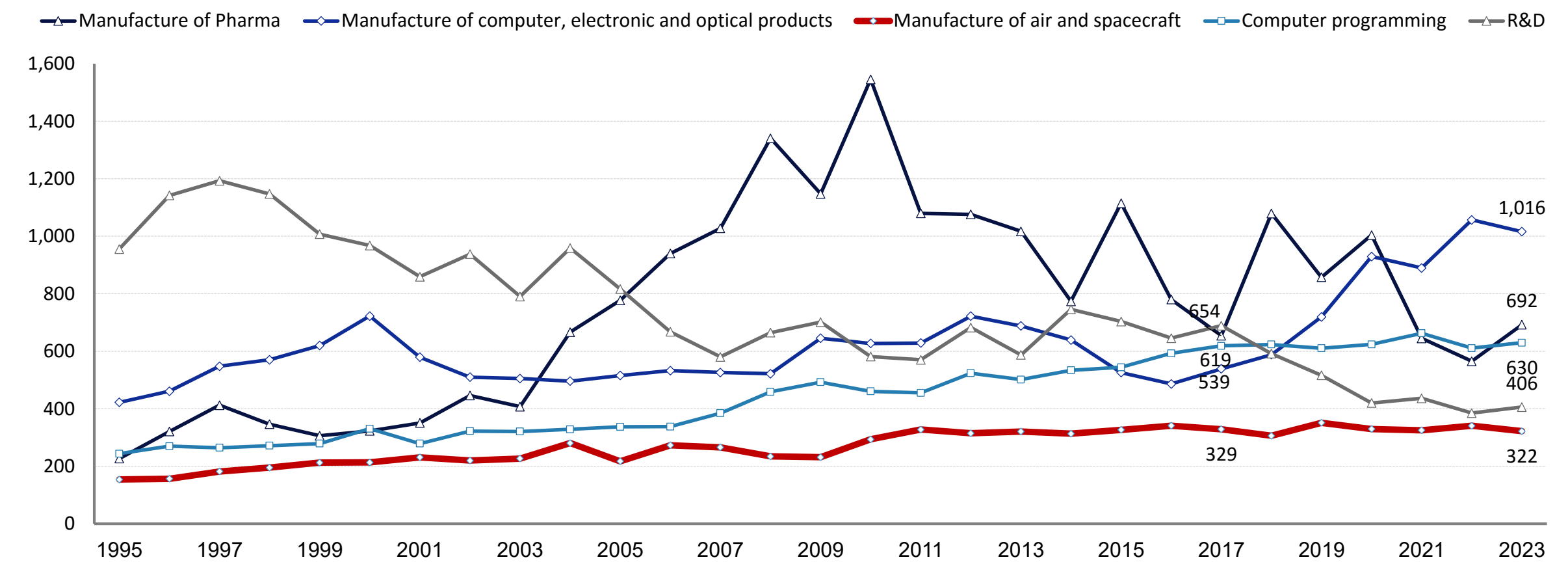
GDP per worker, High-Tech Total, by economic branch (Thousand real NIS)



Source: CBS

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Low profitability of non privatized defense companies, and of the non-military sector in the defense companies

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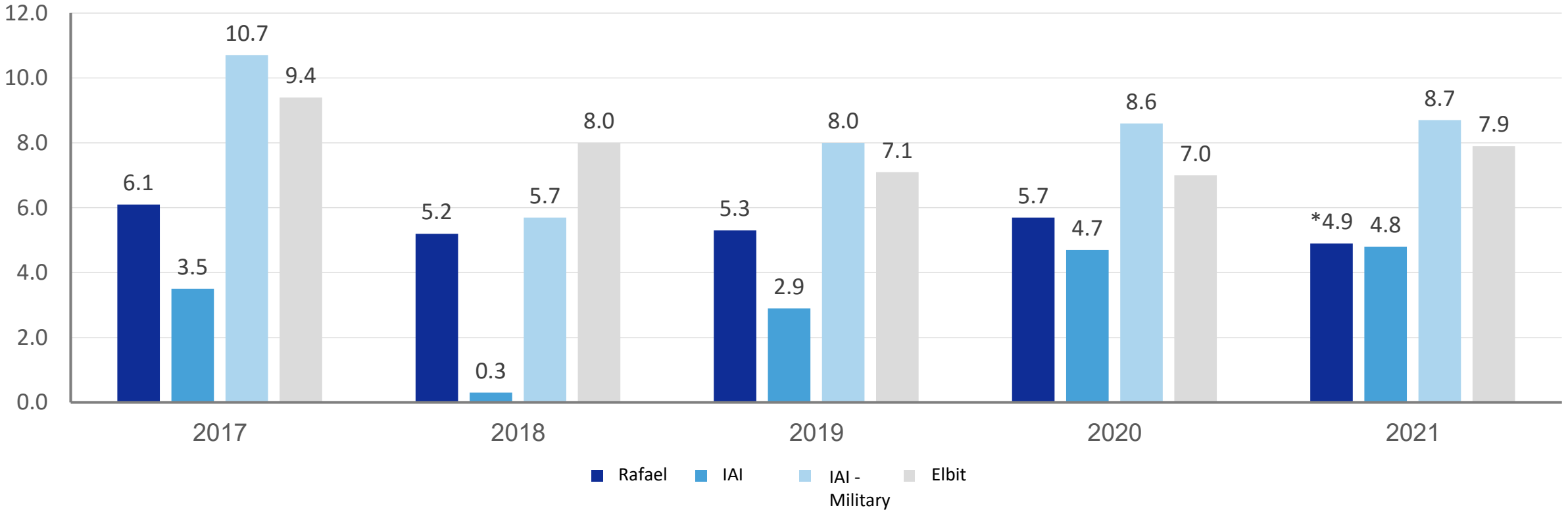
Operating profit of the big three defense companies, 2017-2021, in %



Based on Financial reports of Rafael, IAI, and Elbit, 2017-2021

** Includes Aeronautics and Controp Technologies

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E-government recommendations

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Improve Connectivity & Accessibility:

- Share of the population covered by at least a 4G mobile network
- Fixed broadband subscriptions per 100 inhabitants
- Mobile broadband subscriptions per 100 inhabitants
- Share of businesses with broadband speed of 30 Mbps or more
- Share of households with broadband connections
- Full digitation of the public sector services to business and individual loaded on the cloud

Ease the Doing Business:

- Improve the Services Trade Restrictiveness Index (STRI) Rank to 15 (from rank 34 out of 37)
- Efficient Bureaucracy: Reduce the time it takes to Government to deal with the bureaucracy (joint implementation of Aaron Institute with MOF and Israel National Digital Agency):
  - 100% Key Government Public Services online
  - Digital accessibility – database of all regulatory requirements and procedures
  - Reduce the service time for by 25% over 5 years (based on Standard Cost Model (SCM)) – focus on Business sector
  - Data sharing

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Israel ~ USA comparison

High-Tech Sector Employment, ISR~USA, 2022

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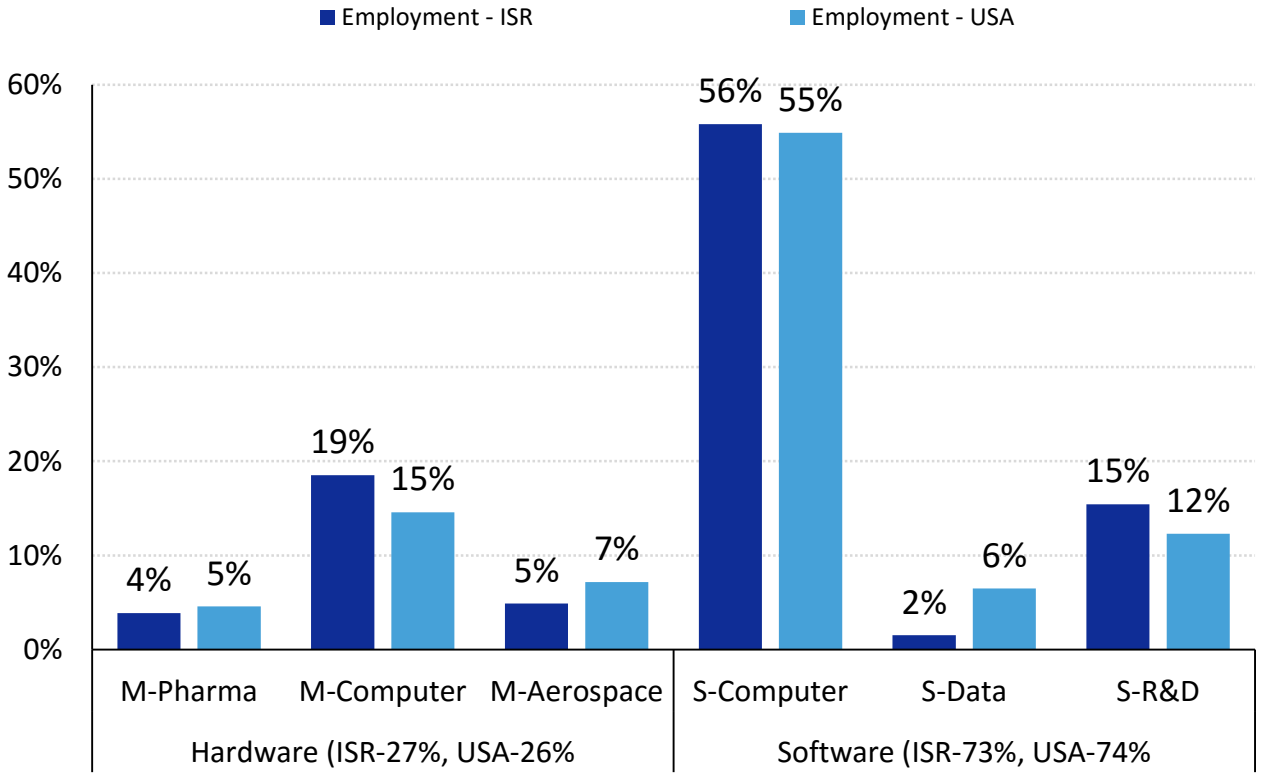
Israel		USA	Hardware	Software
9.9%	11.6%	4.6%	~1/4	~3/4
Aged 15+	Aged 25-64	Aged 16+		

High-Tech Employment Distribution, by economic branch 2022



Description	NAICS-USA	Code-Israel
Pharmaceutical and Medicine **Manufacturing**	3254	21
Computer **Manufacturing**	334	26
Aerospace Product and Parts **Manufacturing**	3364	303
Architectural, Engineering, and Related **Services**	5413	62
Computer Systems Design and Related **Services**	5415	62
Data Processing, Hosting, and Related **Services**	5182	63
Scientific Research and Development **Services**	5417	72

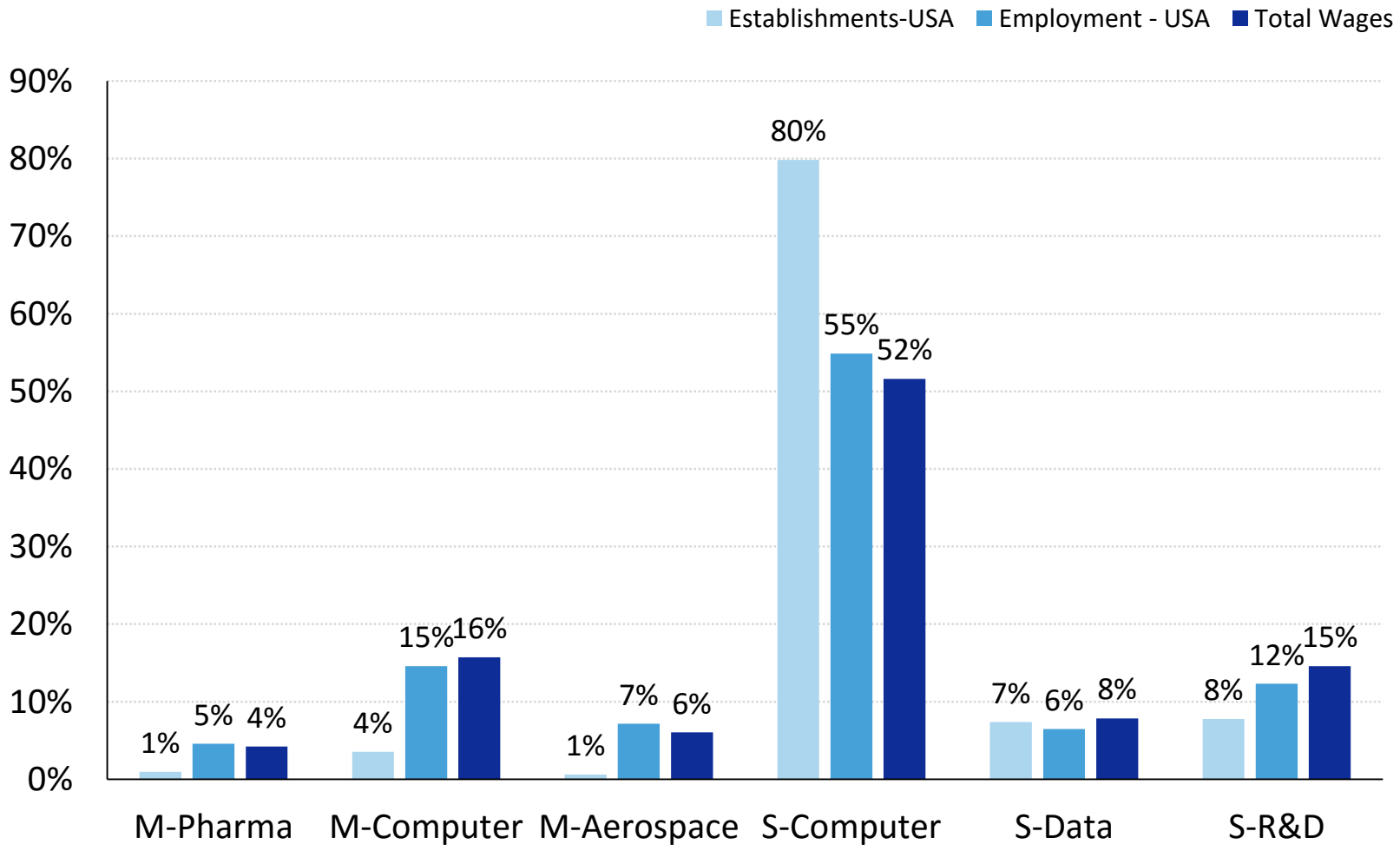
Source: CBS (aged 26-64), BLS (aged 16+)

(Mega) Size matters!!!

USA: 5% of High Tech Manufacturing companies are responsible for 26% of employment and wages.

On average, their size is 7 times larger than the size of software companies

High-Tech Establishments, Employment, Wages Distributions, 2022



Source: CBS, BLS

USA High-Tech manufacturing: consists of Mega Tech companies that constitute monopolies in global markets.

GDP per worker by company type (Thousand $)

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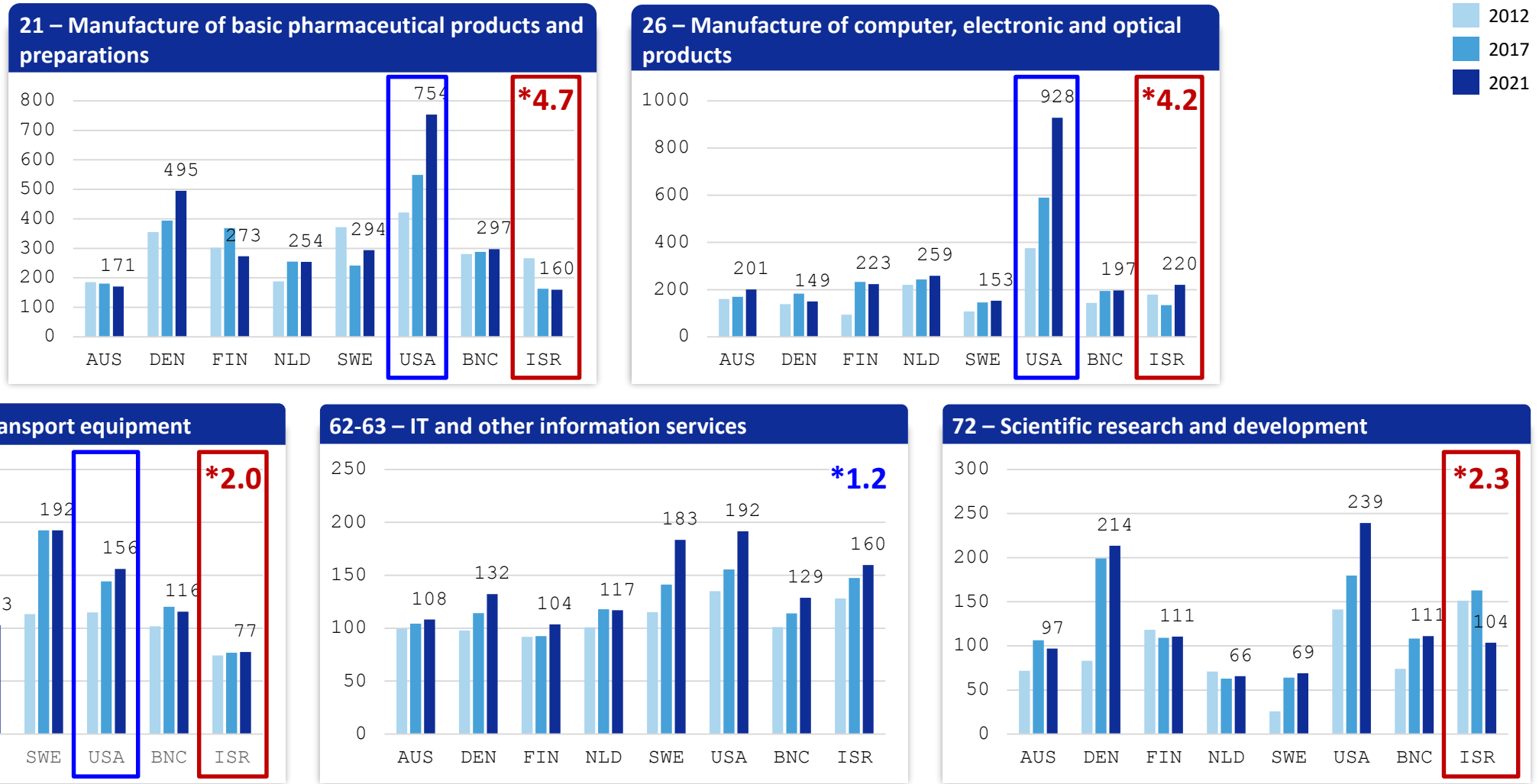

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ISR/USA wage ratio is: 70%, 60% in High-Tech Sector, 80% in Computer Services

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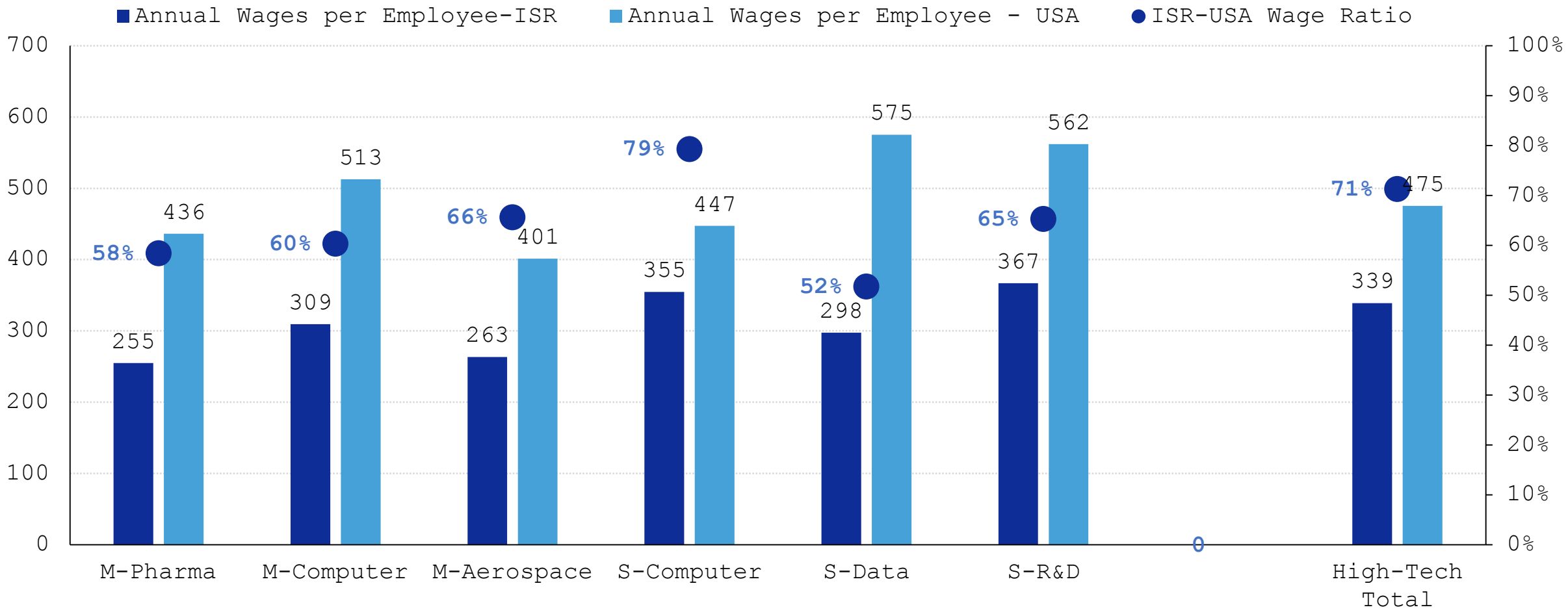
High-Tech Wage, by economic branch 2022, (Thousand NIS, % ratio)



Source: CBS, BLS

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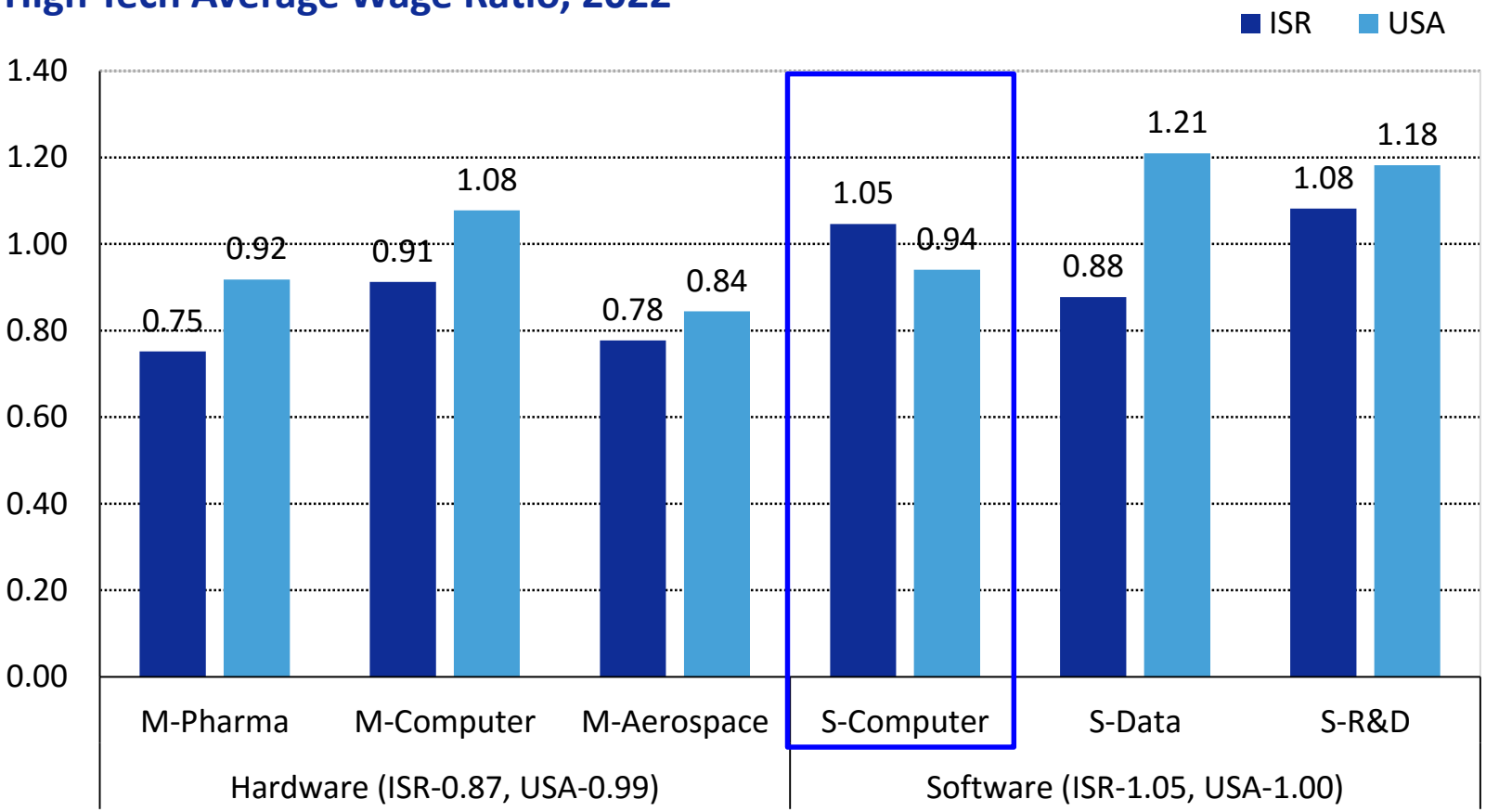
ISR: Wages per Employee in Computer and R&D Services is 5% and 8% higher than average.

~20% wage difference between Software and Hardware companies.

USA: Wages per Employee in Data and R&D Services is 21% and 18% higher than average.

No wage difference between Software and Hardware companies.

High-Tech Wages per Employee: Company Type Related wage to High Tech Average Wage Ratio, 2022



Difference in the "employment culture"?
The employment of soldiers in the defense industry in Israel?

Source: CBS, BLS

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