

POWERING PROGRESS: NAVIGATING THE SEMICONDUCTOR SECTOR'S TRANSFORMATION

Disclaimer:

The information provided on this presentation is general in nature and does not constitute personal financial advice. The information has been prepared without taking into account your personal objectives, financial situation or needs. Because of this, you should consider the appropriateness of the information for your own objectives, financial situation and needs before acting on it. Also, before you decide to invest in a financial product arranged by a representative of Nucleus Wealth Management Pty Ltd, ABN 54 614 386 266, corporate authorised representative of Nucleus Advice Pty Ltd AFSL 515796 (Nucleus Wealth or we or us), it is important that you read and consider the Product Disclosure Statement relating to the product before making any decision about whether to invest in it. Your Nucleus Wealth adviser can help you with this decision if you would like them to do so.

Agenda:

- Info Tech largest sector globally. 23%. Doesn't include Google, Meta, Amazon
- Equal largest part of Info Tech is semiconductors. No Aust exposure
- Should you have exposure, what is it,

Agenda:

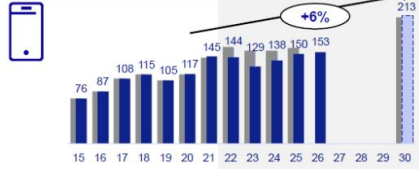
- Chip Intellectual Property (IP) Cores
- Electronic Design Automation (Altium, Cadence) Tools
- Specialized Materials (in commodities sector)
- Wafer Fab Equipment (ASML, Applied Materials, KLA)
- “Fables” Chip Companies (Apple, Qualcomm, NVIDIA, Amazon et al)
- Integrated Device Manufacturers (Memory, Logic, Analog)
- Chip Foundries (TSMC, Samsung)
- Outsourced Semiconductor Assembly and Test (OSAT)

Growth: AI to hit \$100b in 2024

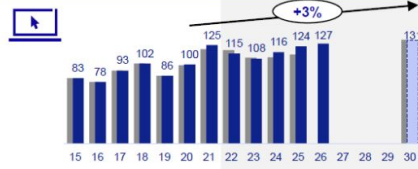
Semi end markets expected to grow 9% through 2030

All markets contributing; Datacenter, Automotive and Industrial expected to outperform

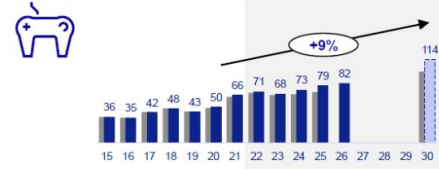
Smartphone (\$bn)



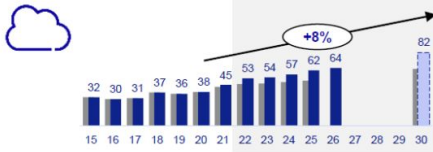
Personal Computing (\$bn)



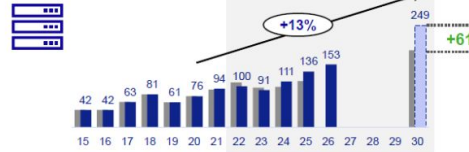
Consumer Electronics (\$bn)



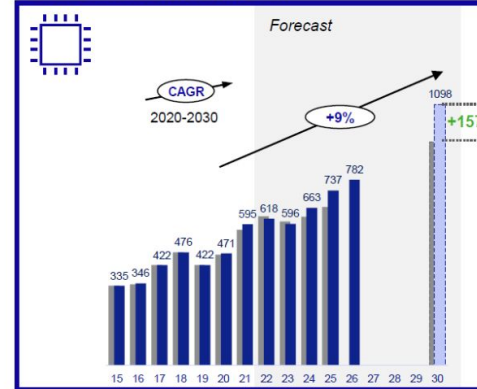
Wired & wireless Infrastructure (\$bn)



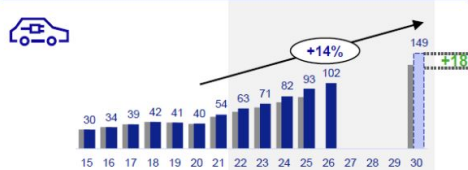
Servers, Datacenters & Storage (\$bn)



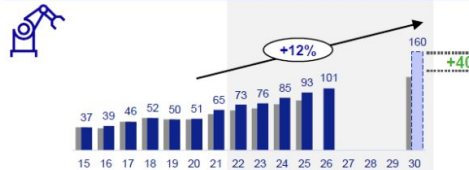
Total Semiconductor (\$bn)



Automotive (\$bn)



Industrial Electronics (\$bn)



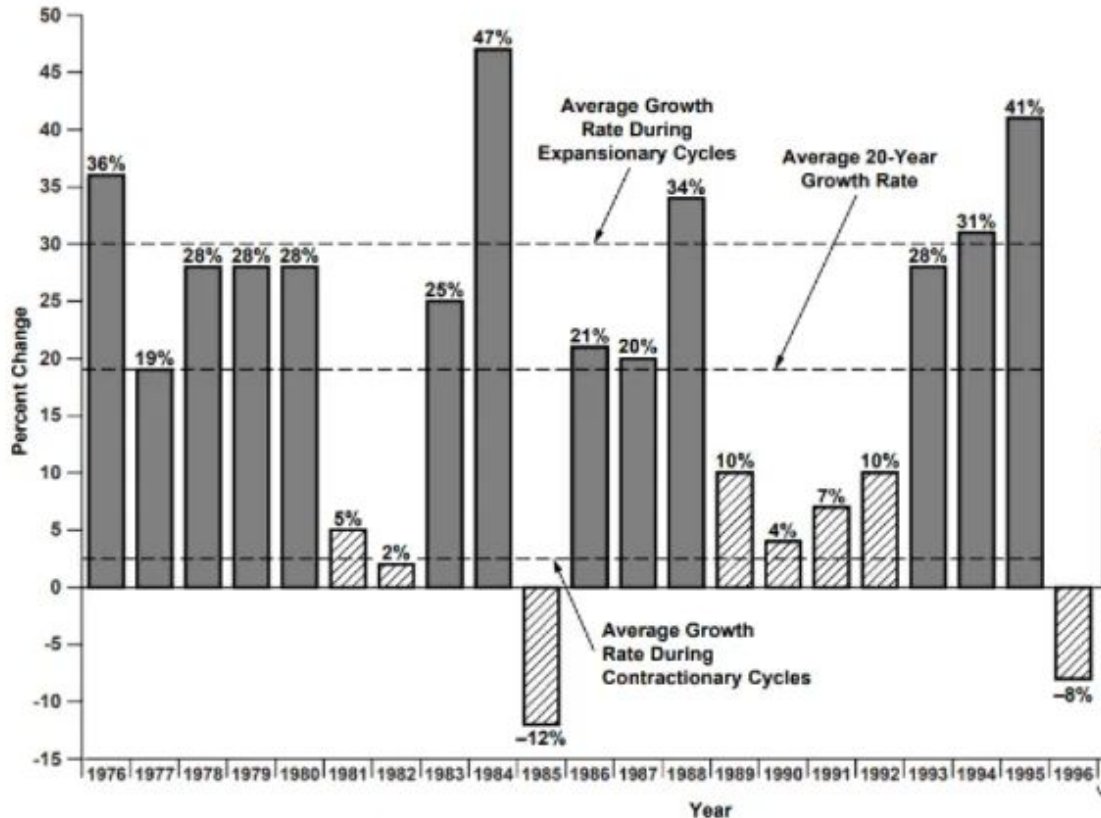
Source: Historical data: Gartner, Outlook: Gartner 3Q22 Forecast (Sep22, 2022) for years '22-'26; Outlook 2030: ASML estimate; segment revenue extrapolated using '20-'26 Compound Annual Growth Rate (CAGR). Some deviations from this methodology due to expected growth profile differences across the decade

■ CMD 2021 ■ CMD 2022
■ CMD 2022 - extrapolation

History:

- Volatile sector. Only as good as your latest hit
- Very cyclical. Build massive factories, flood the market, prices down, then gradually rise
- 1960/70s US Dominant
- 1980s Japan
- 2000s Taiwan
- 2020s China?

Growth has been incredible over time, but wildly volatile



1960/70s US
Dominant

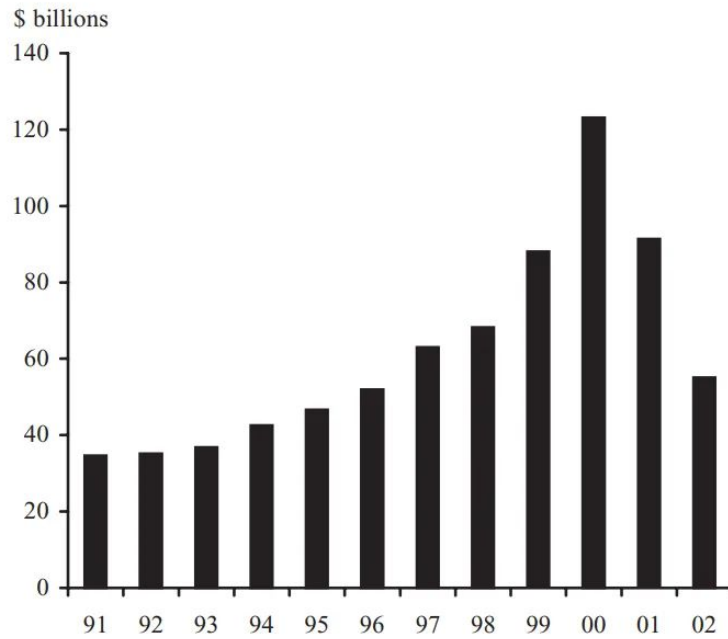
1980/90s rise of
Japan

*Includes captive semiconductor manufacturers.

Source: ICE

Telecommunications companies also got into the game for 2000

FIGURE 4
CAPITAL SPENDING BY PUBLICLY TRADED
TELECOMMUNICATIONS SERVICE PROVIDERS

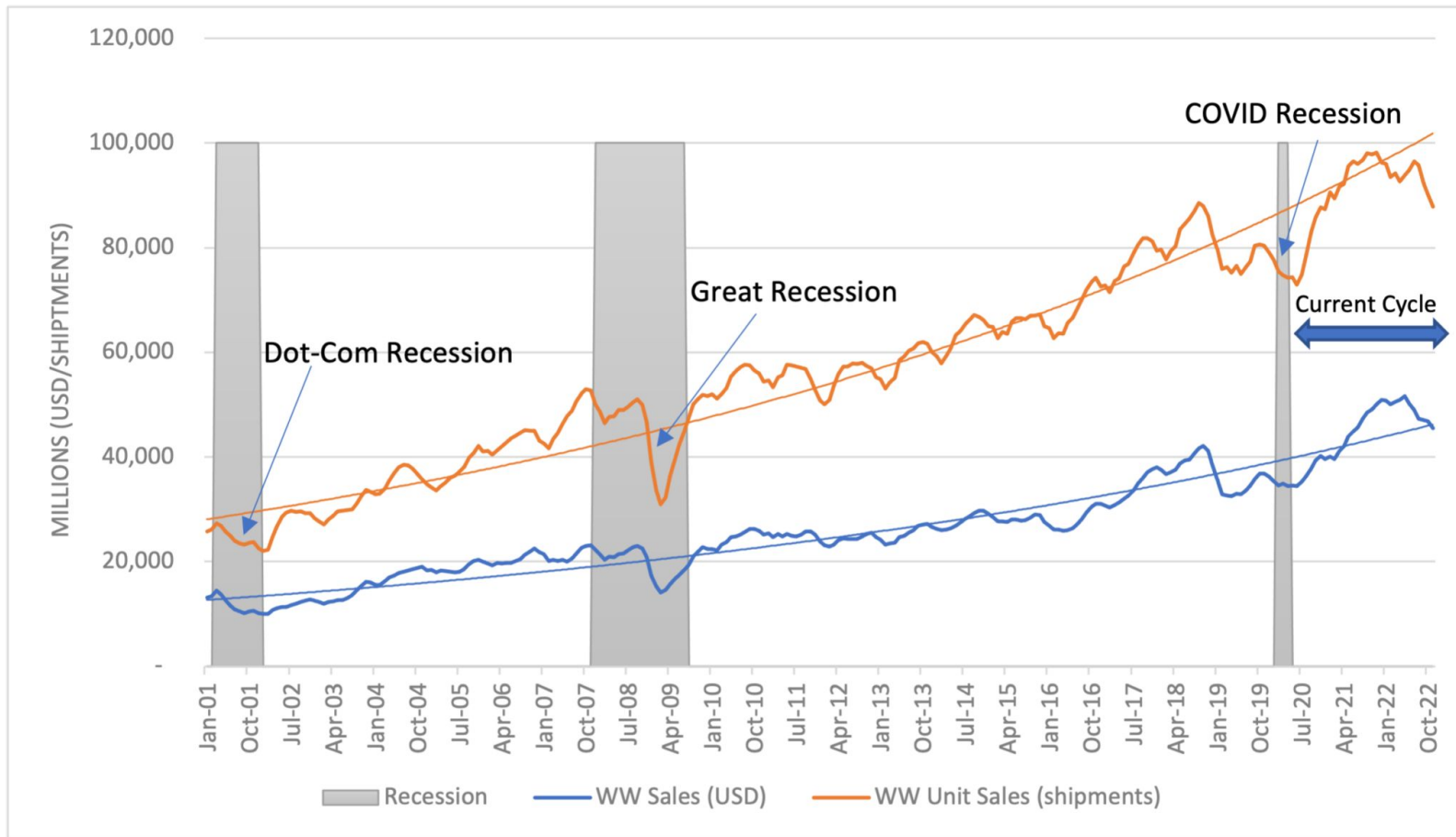


Source: Compustat and author's calculations.

2000: Telcos
demand doubling
every 100 days

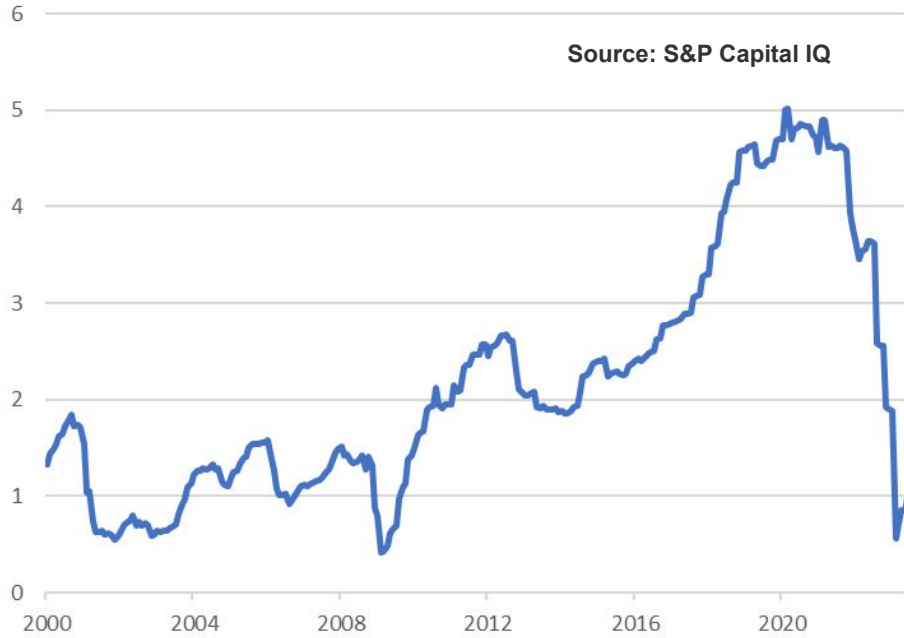
2020: AI demand
doubling every 3
months

90s/2000s rise of Taiwan & Korea. 2020s rise of China?

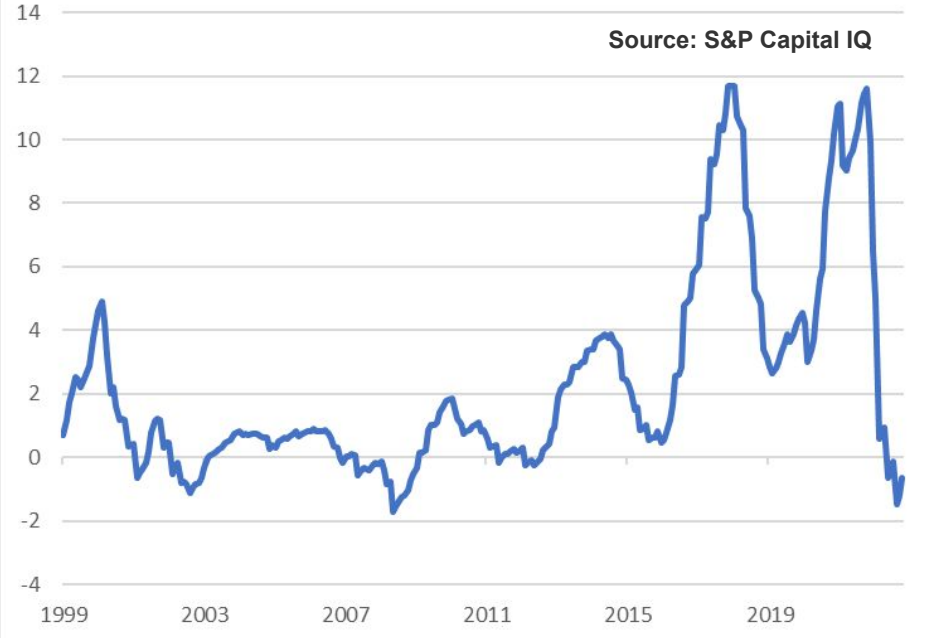


Chip Cycles:

Intel: 12m Forward Forecast EPS



Micron: 12m Forward Forecast EPS



Change in Progress

Pre 1980s technology progress

Government (military)

Business

Consumer

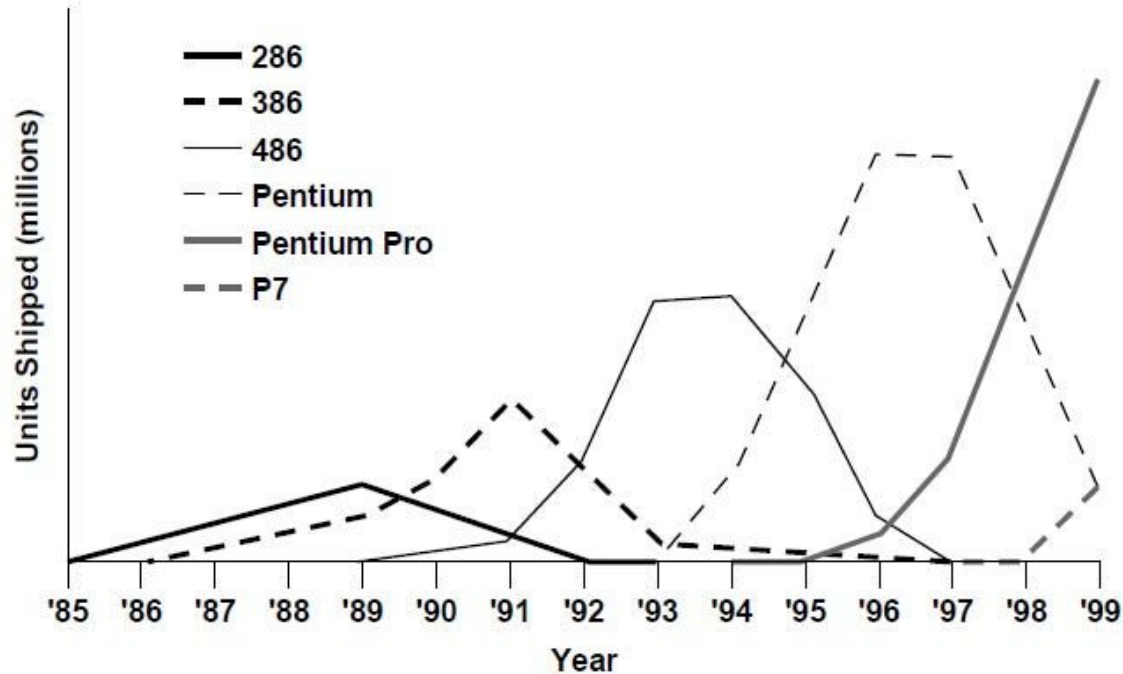
Post 2000s technology progress

Government (military)

Business

Consumer

Only as good as your latest hit:



Source: Intel

22589

Figure 1-25. Product Lifecycle for Intel Processors

Market structure changes:

Figure 4. DRAM Market Share 1970-2020

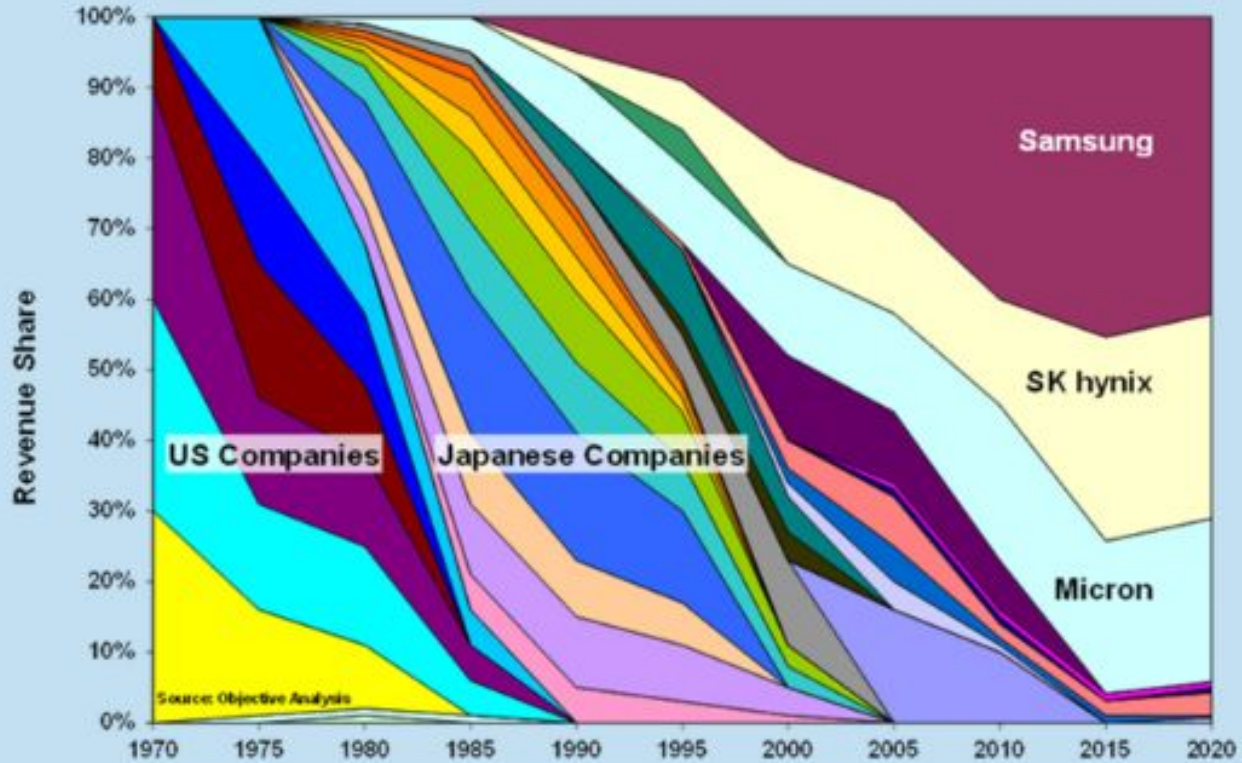


Chart Courtesy of Jim Handy, Objective Analysis www.objective-analysis.com.

Market structure changes:



NVIDIA: Moore's law as a fractal

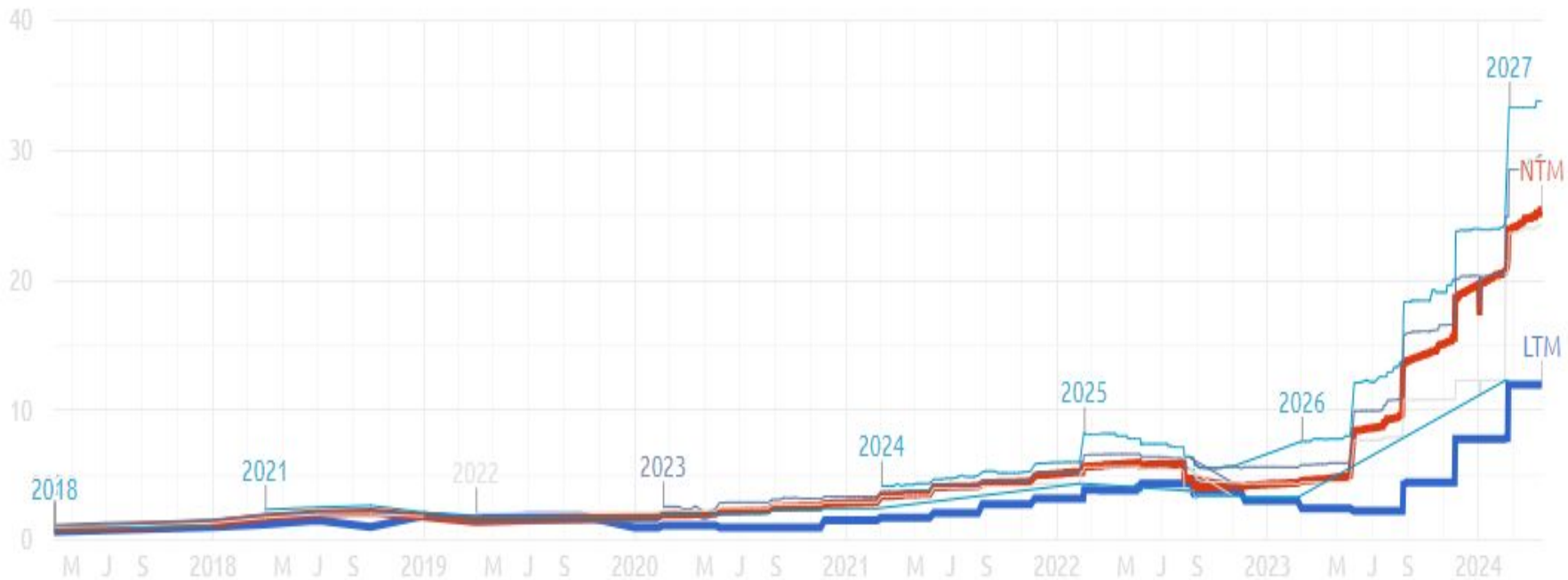
INTERCONNECT DETAILS

Where are we today?

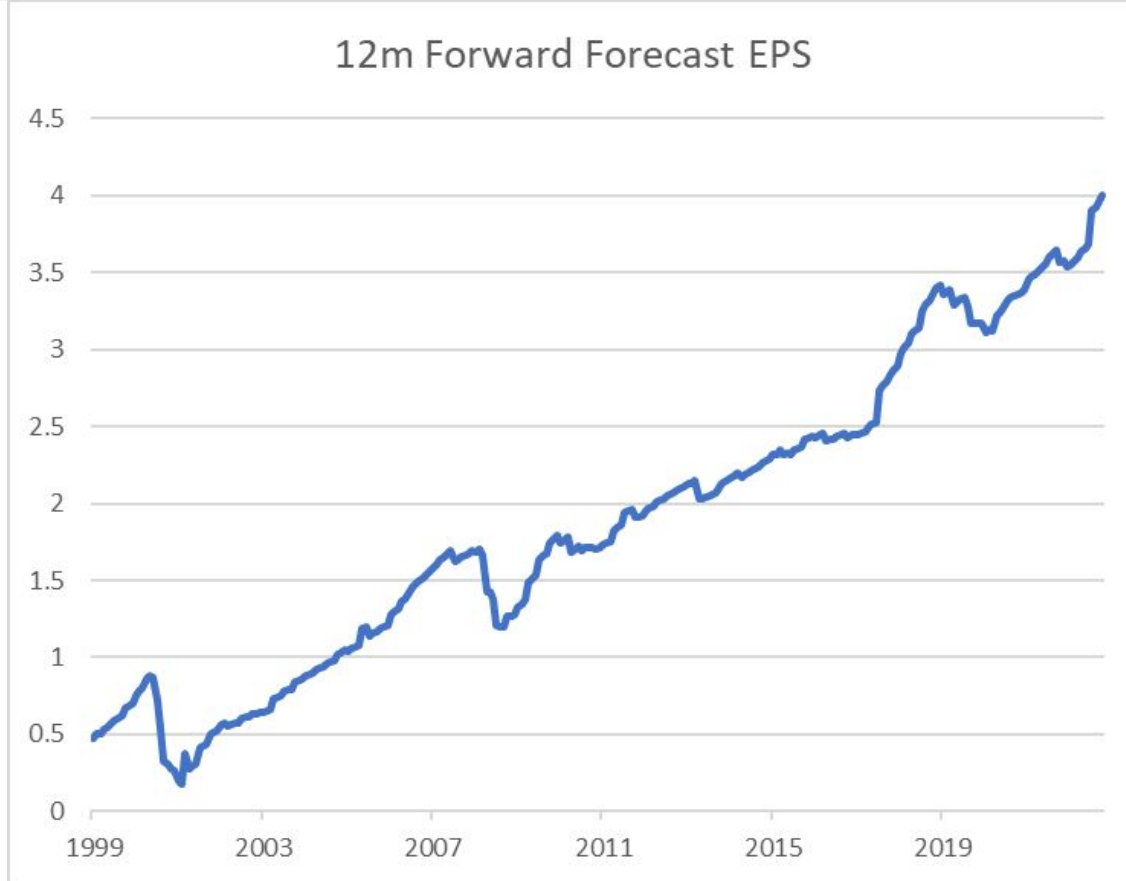
Metric	IB/Eth	NVL	HBM3
Bandwidth (TBps)	0.8	7.2	36
B/W Ratio	1	9	45
Reach	150m	1.5m	0.005m
Power Eff. (pJ/b)	20	5	5
Cost Eff. (\$/Gbps)	0.5	0.05	(almost) Free

NVIDIA: Booming earnings

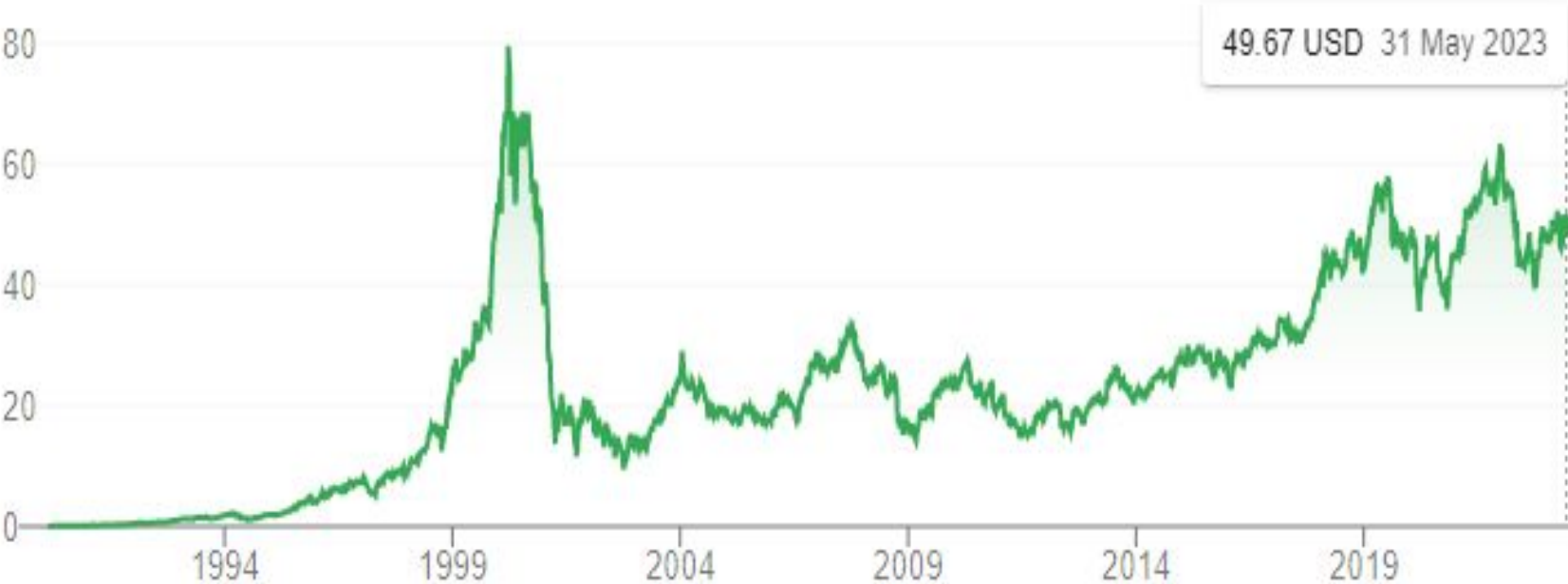
EPS Forecasts history ⓘ



Cisco: quality stock providing picks and shovels to the internet



Cisco: Still below 2000 share price peak



Agenda:

- Nvidia is not standing still and will continue to offer new products. Namely, the upcoming B100, which will help increase the supply of compute for AI meaningfully.
- However Nvidia the stock is now climbing one of the highest walls of worry ever. The market is concerned about its competitive positioning, peaking revenue, and many other hard-to-solve debates. There will be growing pains.
- Proposing new models

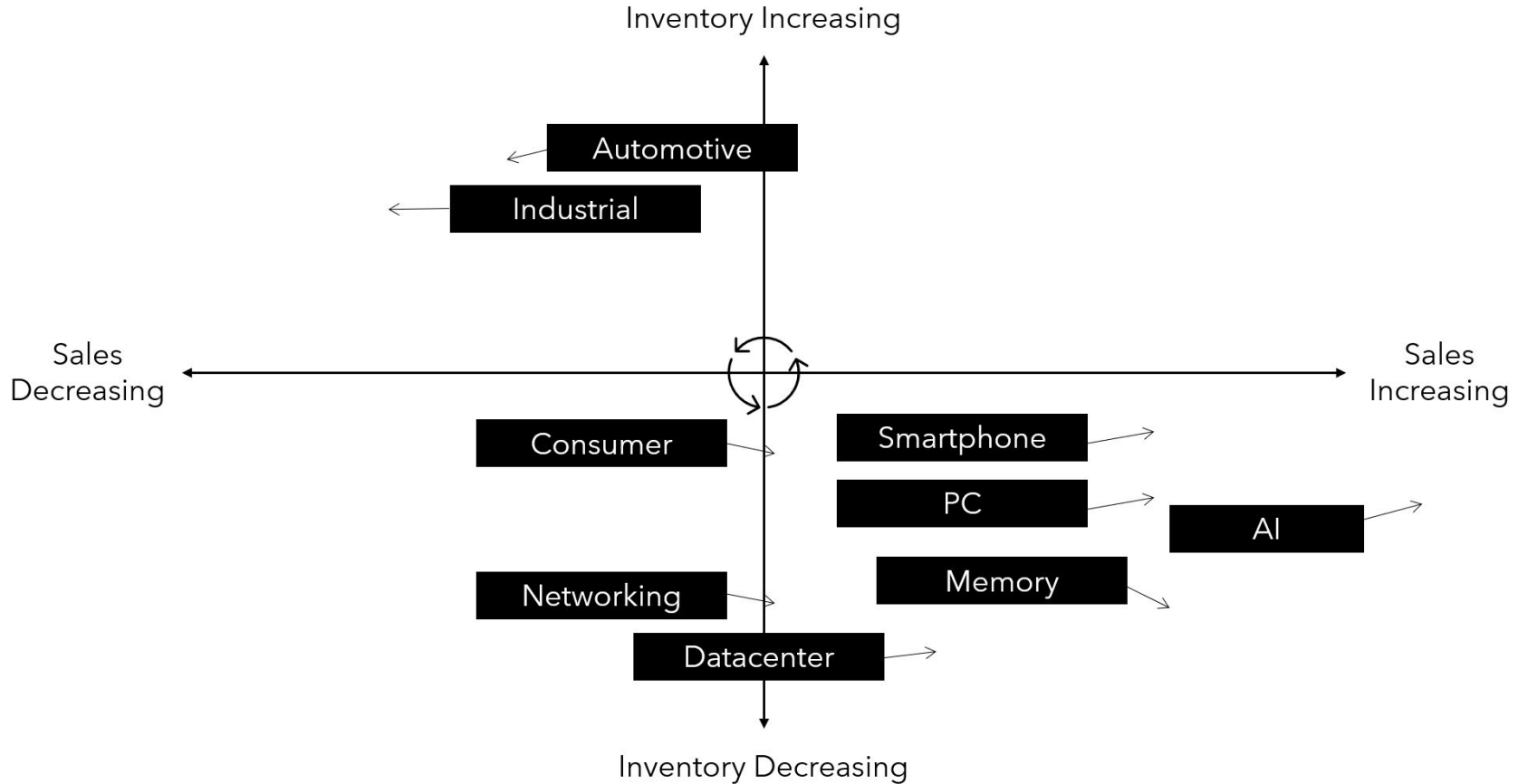
Differences:

- Don't have the debt today...
- Rates are rising
- Overbuild similar
-

Geopolitics:


- US chips
- China
- Europe

Current Cycle:



How to invest:

Technology ▼



Large Technology Stocks ?	Cloud Computing Stocks ?
<input type="text" value="5%"/>	<input type="text"/>
Artificial Intelligence ?	Cybersecurity ?
<input type="text"/>	<input type="text"/>
Robotics ?	
<input type="text"/>	

Investment outlook:

- A little expensive
- Fundamental demand improving, AI booming
- Government subsidies key
- Not a bubble yet. Falling interest rates + more debt and it can be
- Productivity will be real
- Leadership is changing
- Dangerous to be out of the sector

Choose themes to screen from your portfolio away from (i.e. remove stocks)

Climate Change

War

Human Rights

Health

Vices

Animal Rights

Religion

Asset Class

Thematic

Climate Change

- No Fossil Fuels (Worst Offenders) ⊙
- No Fossil Fuels (Any) ⊙
- No Coal Seam Gas or Fracking ⊙
- No Nuclear Power ⊙
- No Old Growth Forest Logging ⊙



Build Your Portfolio

Need help with this page? Video Tutorial

Account Selection

Investment Choice

Risk Profile

Build Your Portfolio

Ethical Overlay

Review

Applicants

Bank Details

Compliance

Final Review

Portfolio Tilts



Quality Stocks

Value Stocks

Growth Stocks

Oil & Gas Stocks

Gold Stocks

Agribusiness

Large Technology Stocks

Cloud Computing Stocks

Robotics/AI

Video Gaming

Cybersecurity

Clean Energy

Defensives

Battery Supply Chain

Nuclear Power

Defense Contractors

Travel

Luxury Goods

Logistics

Global Communication Services

Global Consumer Discretionary

Global Consumer Staples

Global Energy

Global Financials

Global Health Care

Global Industrials

Global Information Technology

Alternatives:

Investment Style Factors 

Climate Change 

Technology 

Consumption 

Commodities 

Military 

GICS Sectors 

Technology

Add these stocks to my portfolio

Large Technology Stocks



Cloud Computing Stocks



Robotics/Artificial Intelligence




Cybersecurity



Type of Tilt

Select Weights 

Medium Weight 

Medium Weight 

Select Weights 

Market Size:

- Start with \$200b on Hyperscale capex.
- Say it goes to \$500b in short order i.e. +300b.
- 55% to data centres. Rest to other factors. +160b
- Data centres make 30%+ margins. So +110b
- Say 55-60% on servers (rest on power, networking, staff, infrastructure). So +65b
- Proportion of server cost. Say 20% (optimistic). = +15b on AI Chips

Viewer question of the week:

Are semiconductors at the start of a boom or in the middle of a bubble?

Drop your answers in the comments

Personalise Your Portfolio

Screens

You can exclude the below to customise your portfolio

Climate Change	War	Human Rights	Health	Vices
Animal Rights	Religion	Asset Class	Thematic	

- No Fossil Fuels (Worst Offenders) ?
- No Fossil Fuels (Any) ?
- No Coal Seam Gas or Fracking ?
- No Nuclear Power ?
- No Old Growth Forest Logging ?

Tilts

You can add the below to customise your portfolio

Investment Style Factors	Climate Change	Technology	
Consumption	Commodities	Military	GICS Sectors

- Quality Stocks ?
- Value Stocks ?
- Growth Stocks ?
- Defensives ?



Personalise your portfolio now >

Investment Outlook

- **Benefitting:**
 - Big tech. Cloud computing. Chip makers
 - Quality stocks. Monopolies. Oligopolies.
 - Healthcare / high service cost businesses
 - Defense
 - Interest rate sensitive?
- **Suffering**
 - Value stocks
 - Intermediaries
 - Broadly competitive industries
 - Disruptable industries

Choose themes to screen from your portfolio away from (i.e. remove stocks)

Climate Change

War

Human Rights

Health

Vices

Animal Rights

Religion

Asset Class

Thematic

Climate Change

- No Fossil Fuels (Worst Offenders) ⊙
- No Fossil Fuels (Any) ⊙
- No Coal Seam Gas or Fracking ⊙
- No Nuclear Power ⊙
- No Old Growth Forest Logging ⊙

Personalise Your Portfolio

Screens

You can exclude the below to customise your portfolio

Climate Change	War	Human Rights	Health	Vices
Animal Rights	Religion	Asset Class	Thematic	

- No Fossil Fuels (Worst Offenders) ?
- No Fossil Fuels (Any) ?
- No Coal Seam Gas or Fracking ?
- No Nuclear Power ?
- No Old Growth Forest Logging ?

Tilts

You can add the below to customise your portfolio

Investment Style Factors	Climate Change	Technology	
Consumption	Commodities	Military	GICS Sectors

- Quality Stocks ?
- Value Stocks ?
- Growth Stocks ?
- Defensives ?



Personalise your portfolio now >



Build Your Portfolio

Need help with this page? Video Tutorial

- Account Selection
- Investment Choice
- Risk Profile
- Build Your Portfolio**
- Ethical Overlay
- Review
- Applicants
- Bank Details
- Compliance
- Final Review

Portfolio Tilts



Quality Stocks

Value Stocks

Growth Stocks

Oil & Gas Stocks

Gold Stocks

Agribusiness

Large Technology Stocks

Cloud Computing Stocks

Robotics/AI

Video Gaming

Cybersecurity

Clean Energy

Defensives

Battery Supply Chain

Nuclear Power

Defense Contractors

Travel

Luxury Goods

Logistics

Global Communication Services

Global Consumer Discretionary

Global Consumer Staples

Global Energy

Global Financials

Global Health Care

Global Industrials

Global Information Technology

More from Nucleus Wealth:

Content: [Nucleuswealth.com/content](https://nucleuswealth.com/content)

**Have a guest or topic suggestion for the show?
Leave a comment on YouTube**

Find us on all major (and minor) podcast platforms:




Social media:

 Facebook.com/nucleuswealth

 Linkedin.com/company/nucleuswealth

 Instagram.com/nucleus_wealth

 Twitter.com/nucleuswealth