



# HBM: DRAM's Bright Future

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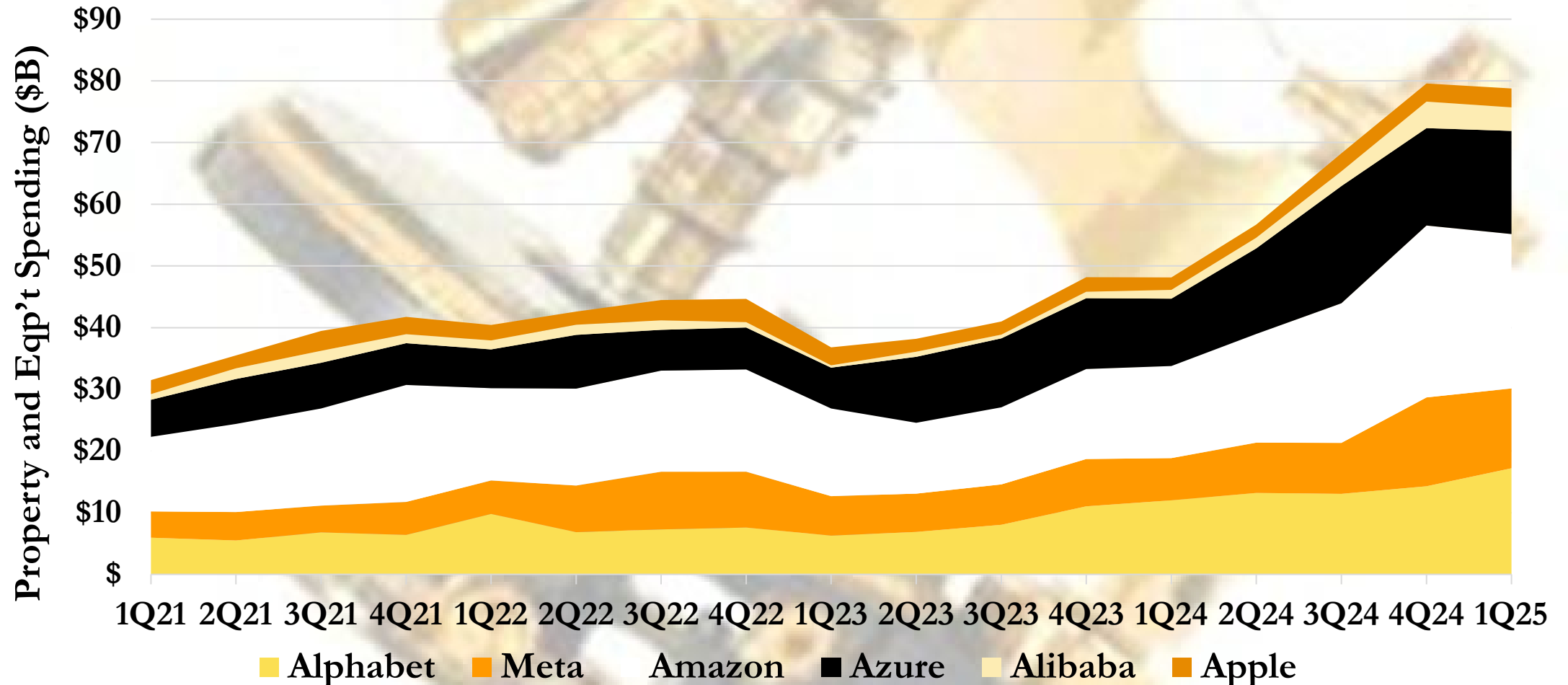
**OBJECTIVE ANALYSIS**



# It's All About AI

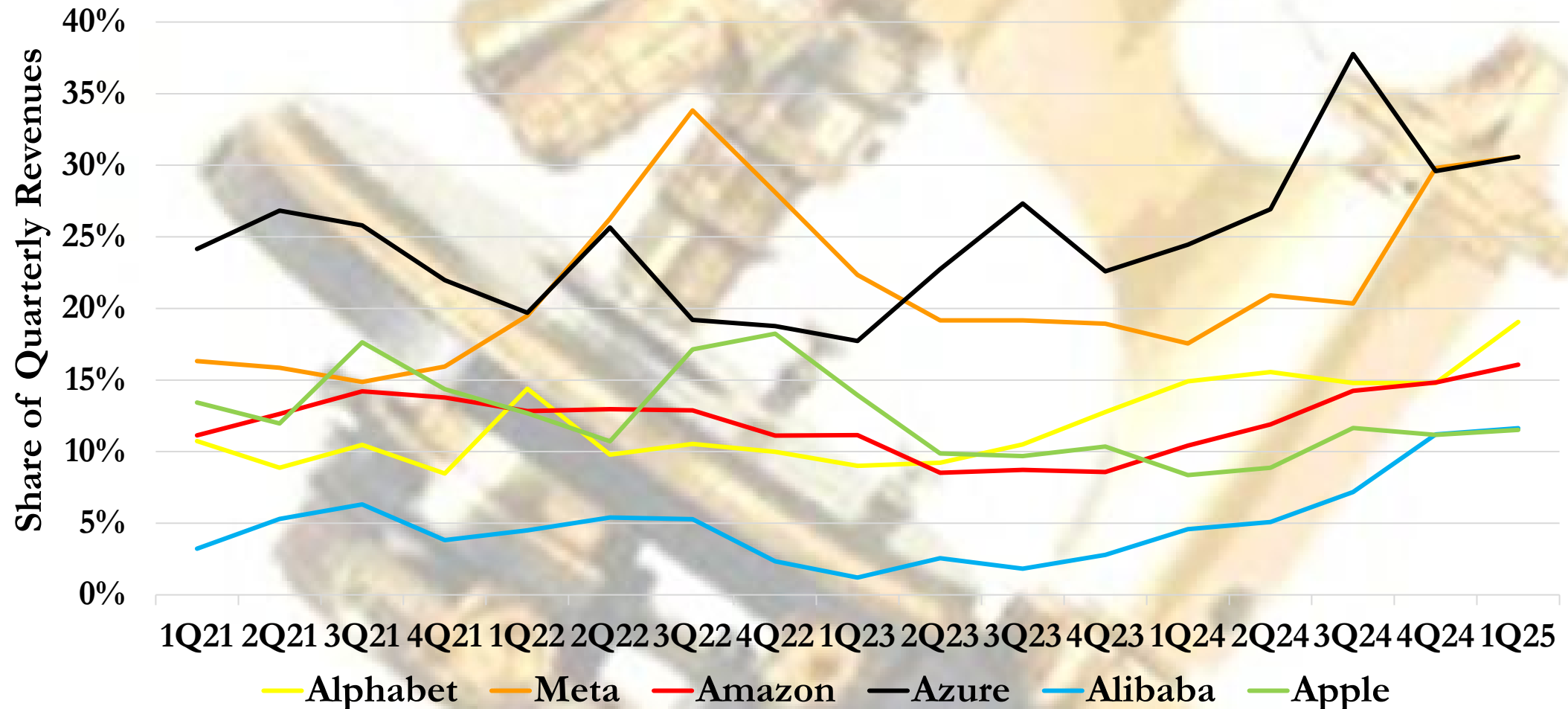
# Hyperscaler CapEx Binge is Slowing

## Hyperscale Datacenter Capital Spending

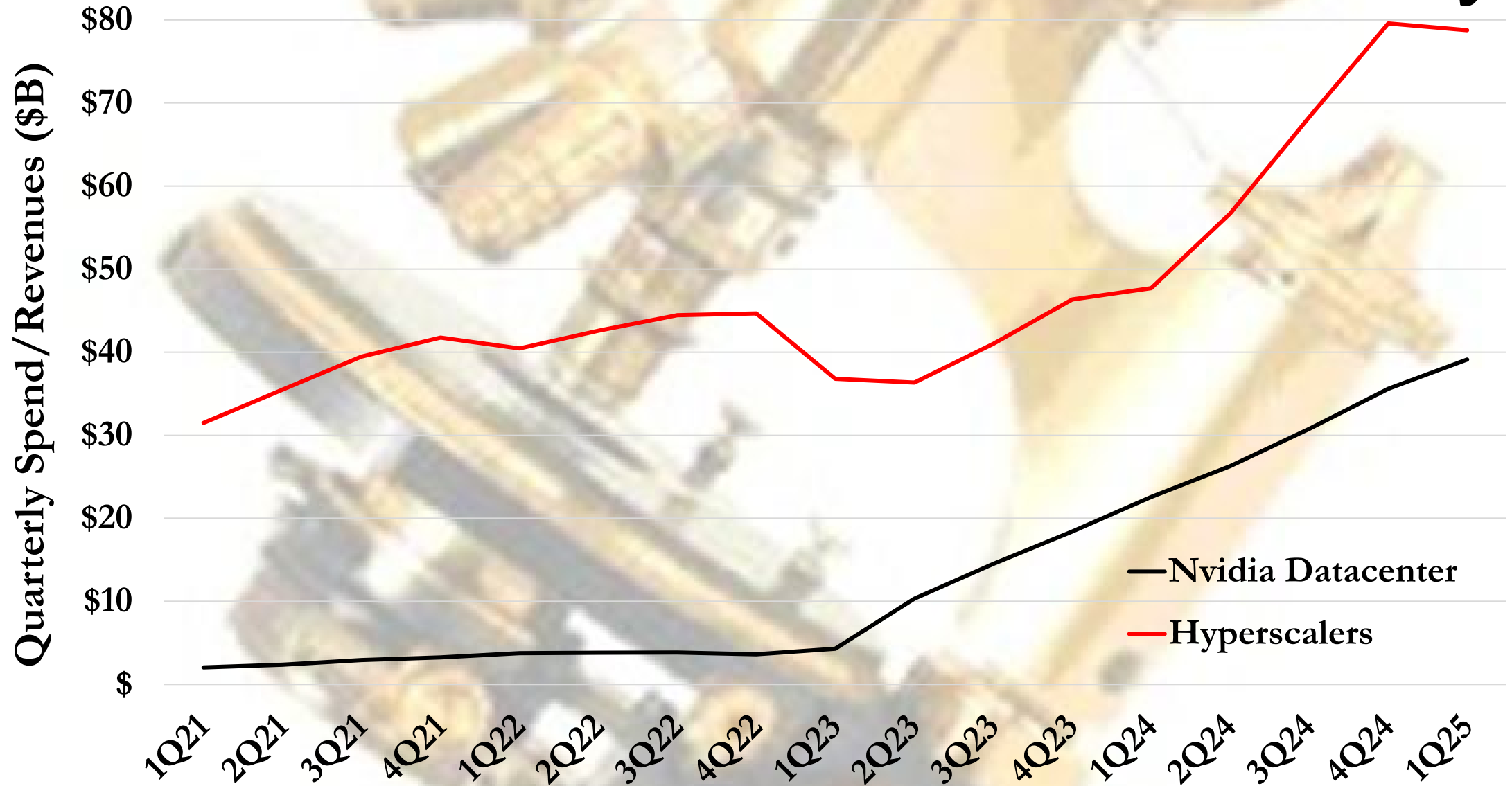


# Still a Sizeable Share of Revenues

## Hyperscale Datacenter Spend/Revenues



# Nvidia Datacenter Growth is Steady





# Can They Keep This Up?

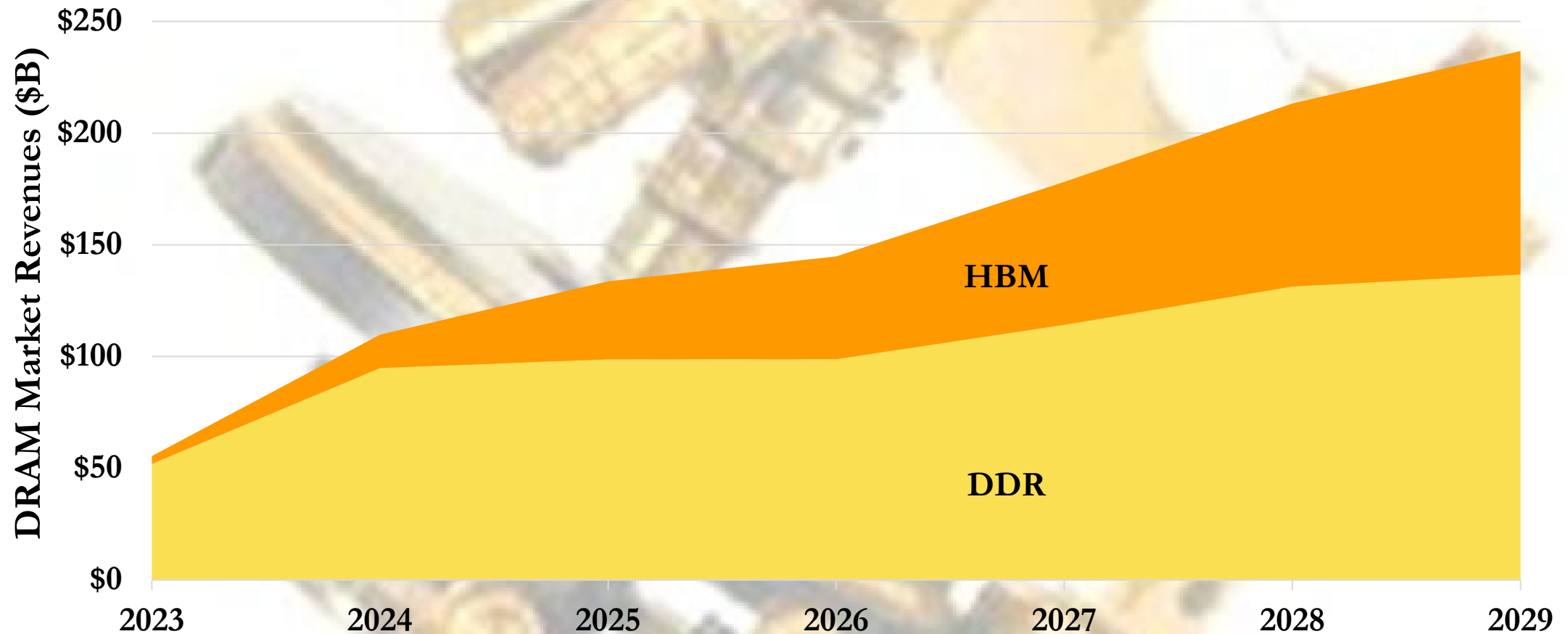
Current Spending is Ahead of Market Development

# Where's All This Money From?

- Anticipated personnel savings
  - Coders
  - Creators
- New applications
- Sovereignty campaigns
  - Keep your country's secrets within its borders

# The DRAM Market Needs HBM

HBM Market Bolsters Slow DDR Sales





# DRAM Market Realities

- DRAM is a commodity
- Everyone competes on price
- Oversupplies cause price collapses
- Oversupplies are inevitable
- Hyperscaler demand gyrates wildly

# Where is HBM Headed?

- Users want more bandwidth
  - Constrained by “Beachfront”
- HBM4 doubles channel width
  - Radical bonding changes required
- D2D (Die-to-Die) offers a solution
  - More bandwidth with less beachfront
- 3D Packaging under evaluation

# Energy is an Issue

- Datacenter energy consumption very concerning
  - Today's solution: small local nuclear plants
- HBM refresh energy is wasteful
  - Some are exploring high-bandwidth flash (HBF)
- AI architecture is still in flux
  - Restructured code may reduce energy needs



# Will HBM Rescue the DRAM Market?

- **New report from Objective Analysis**
- Covers all perspectives
  - What is HBM and why it's so costly
  - Supply Chain – who buys it and why
  - Price dynamics: HBM vs. DRAM
  - Forecast (Revenues, units, ASP)
- Coning soon for immediate download:

[Objective-Analysis.com/reports](https://Objective-Analysis.com/reports)