300mm Prime:
Maximizing the Return on Fab Investment

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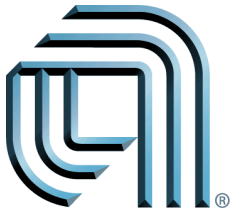

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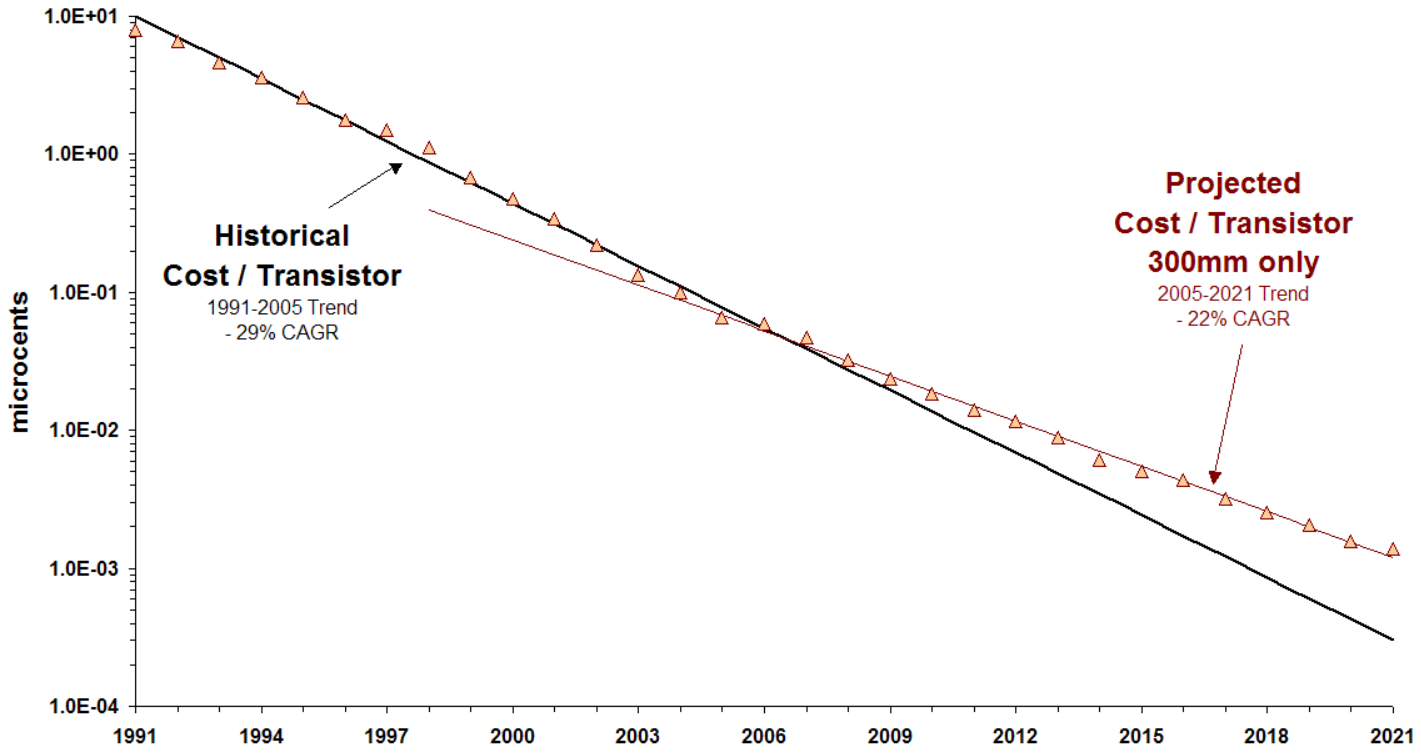
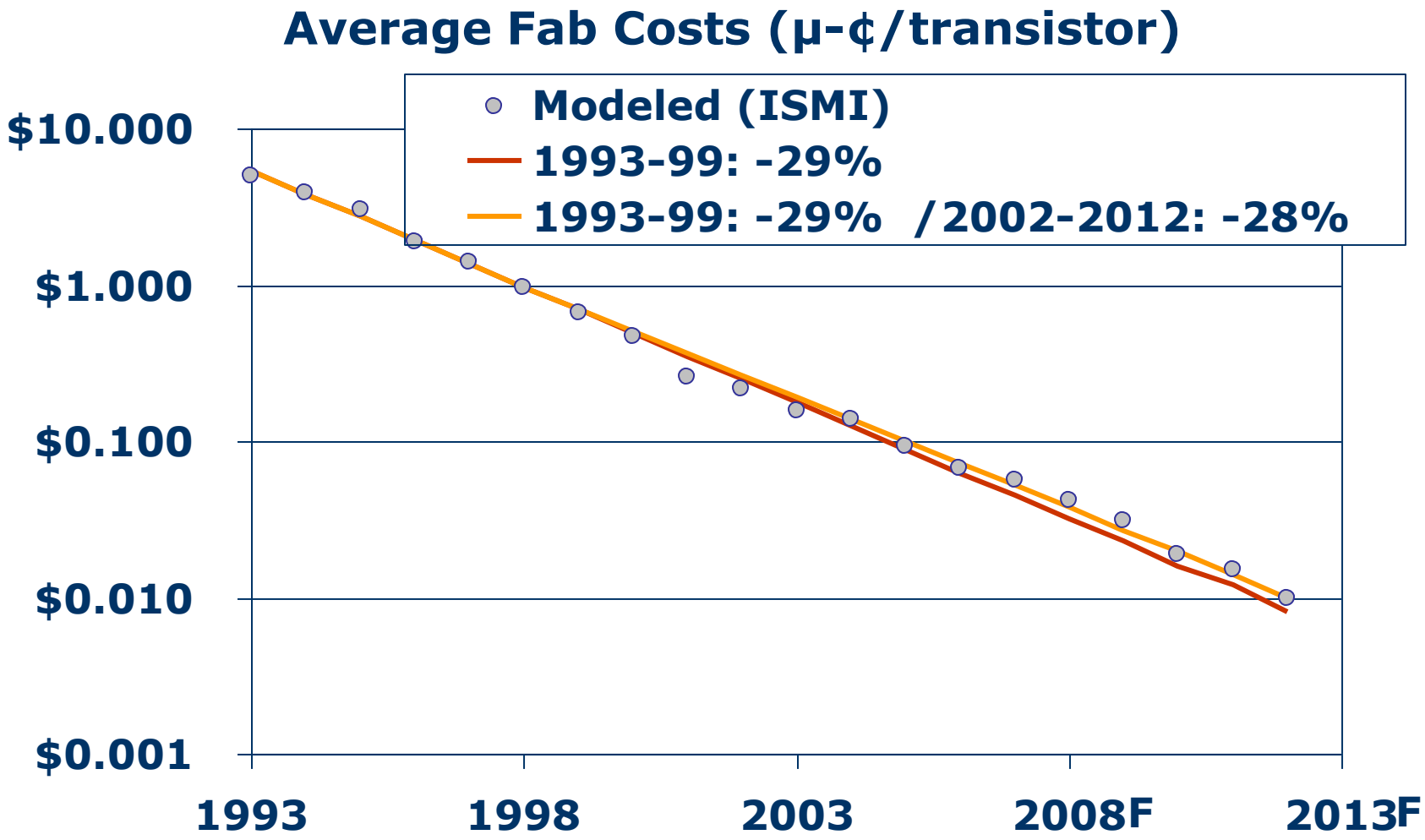
The “Productivity” Challenge

Average Fab Costs per Transistor



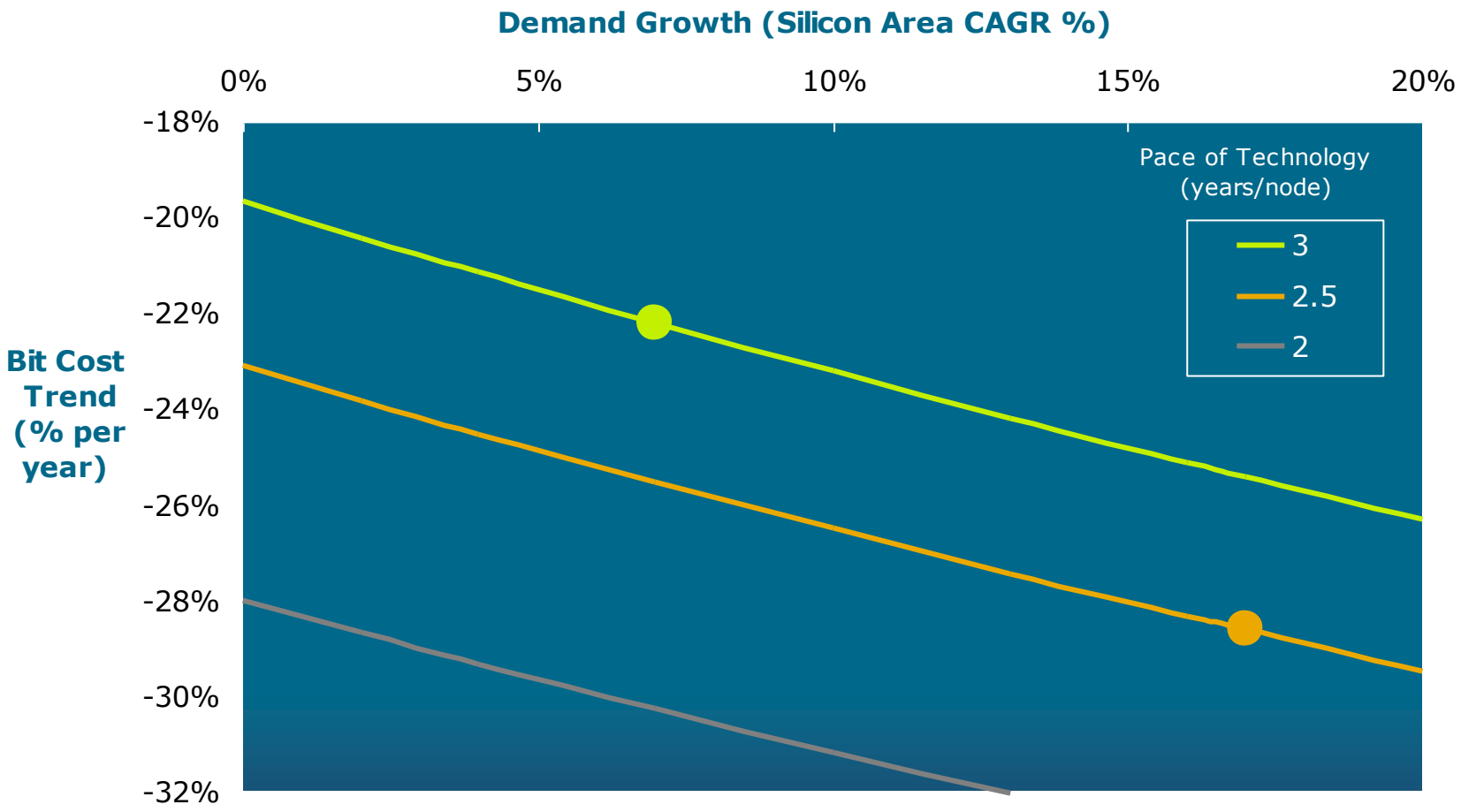
Source: ISMI

The Challenge… Revisited

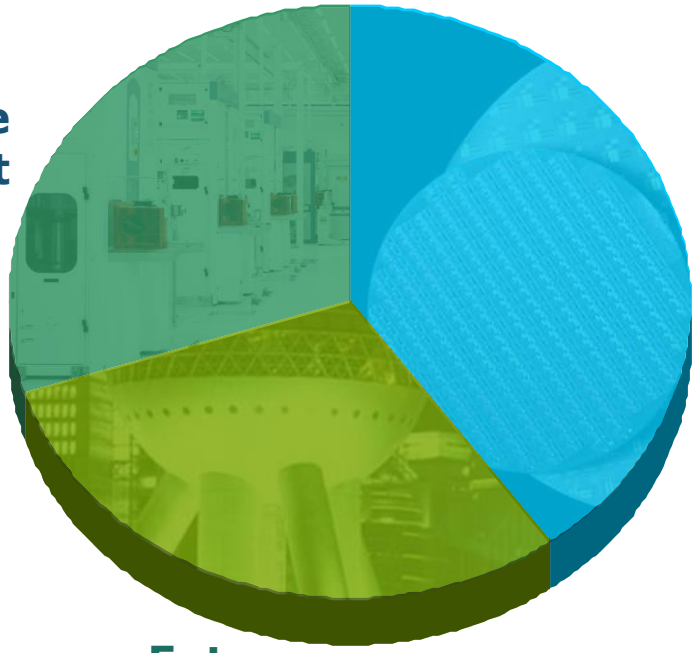


Source: Applied analysis of ISMI's Economic Model

What Are The Root Causes?



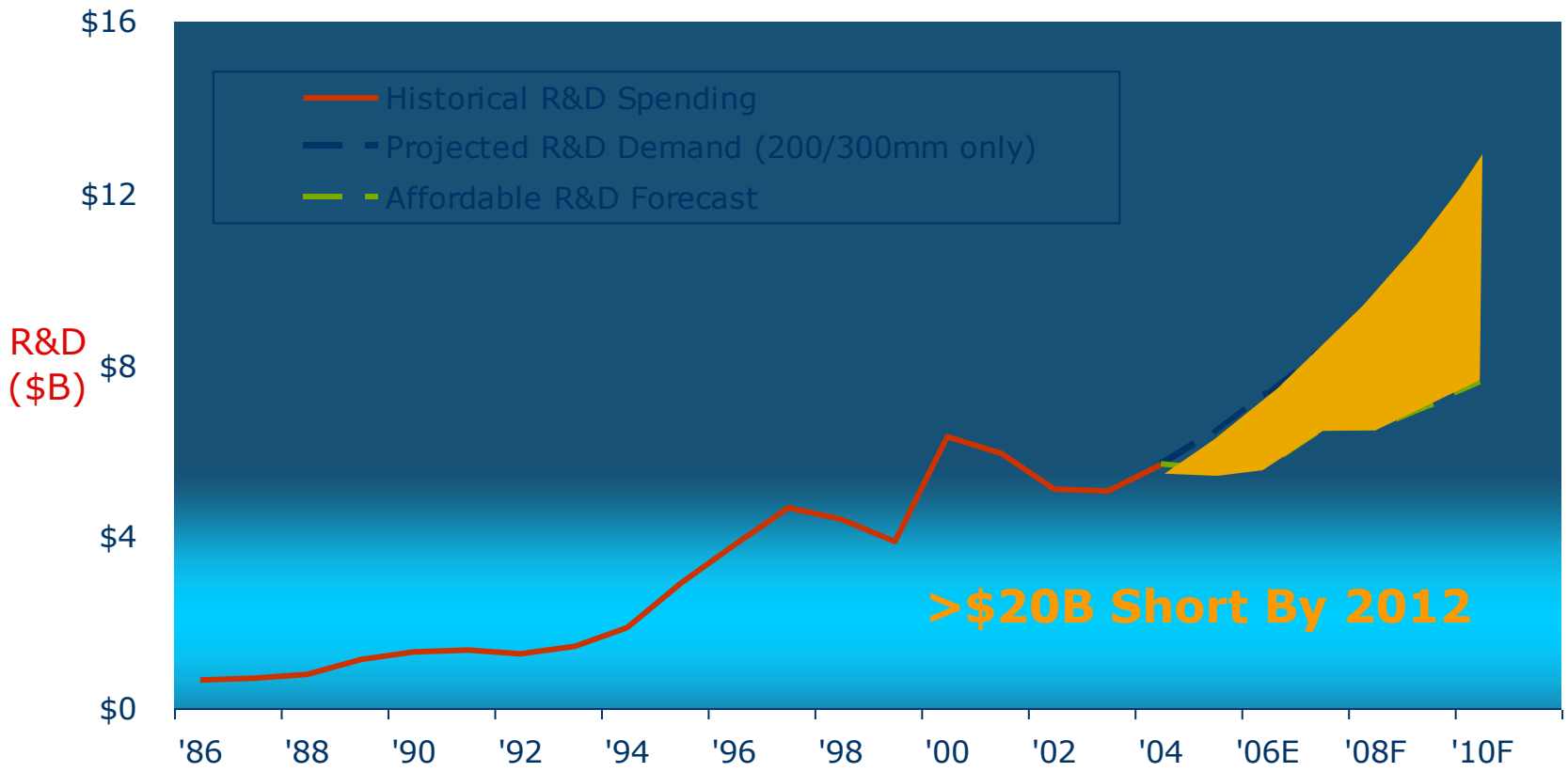
How Should The Industry Spend Development $?



What Should Be The Priorities?

Illustrative

Equipment R&D Gap

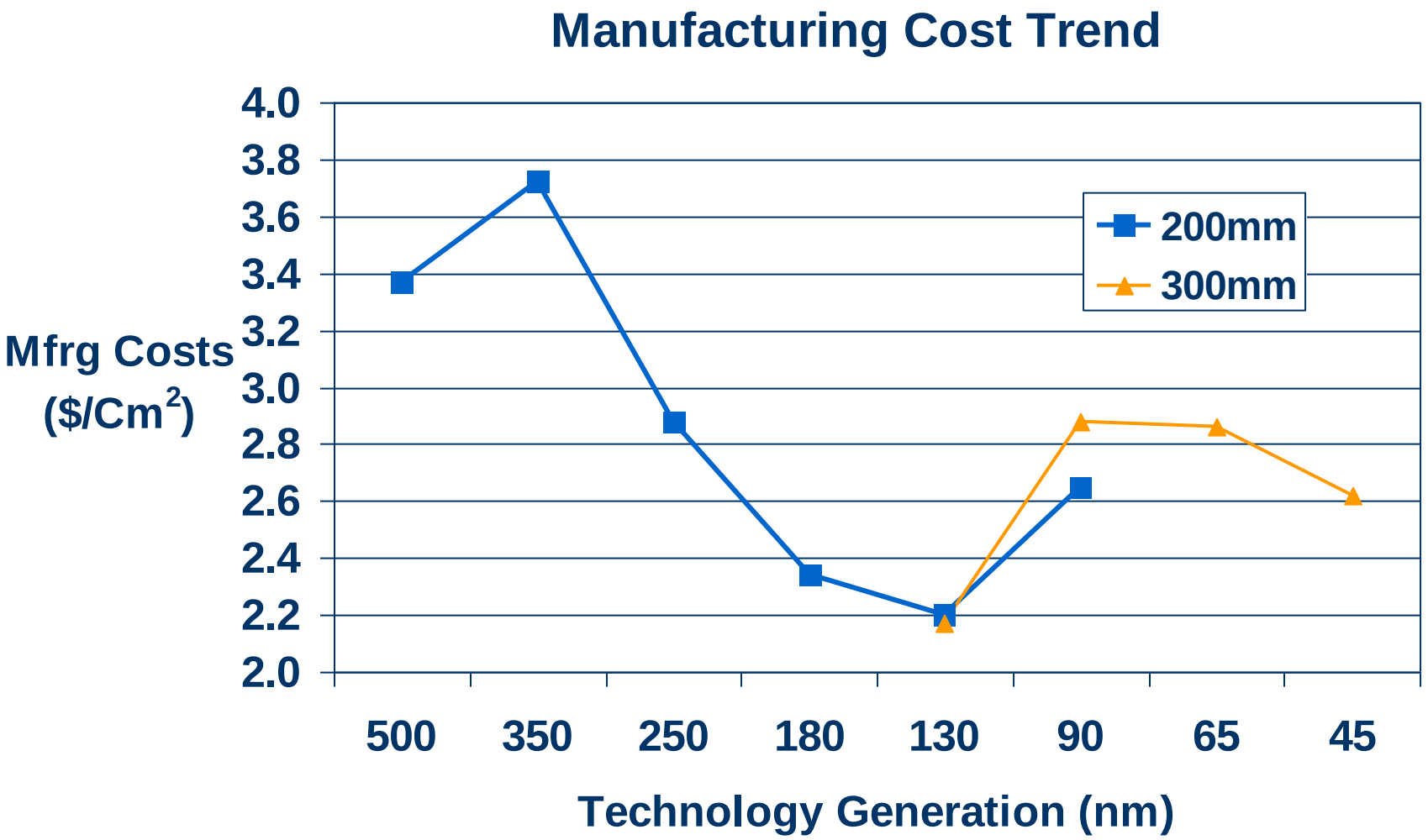


Note: Affordable R/D forecast assumes 14% of equipment industry revenues
Sources: S&P, SIA, SEMI, Infrastructure Advisors

Future Technology or Future Substrate?

	Technology	Substrate
Value Proposition	▪ Double chip performance ▪ Increase devices per wafer by 100%	▪ Increase devices per wafer by 125%
Chip Demand/ASP Impact	▪ Vital	▪ None
Capital Cost Impact	▪ Moderate increase	▪ Significant increase in intrinsic costs for all tools ▪ Higher device throughput for some
Variable Cost Impact	▪ Moderate increase	▪ Significant increase
Scope of Fab Impact	▪ Partial	▪ Total / systemic
Installed Base Benefit	▪ Significant	▪ None
Implementation/ Timing Risk	▪ Significant	▪ Enormous
Investment	▪ Big	▪ Huge

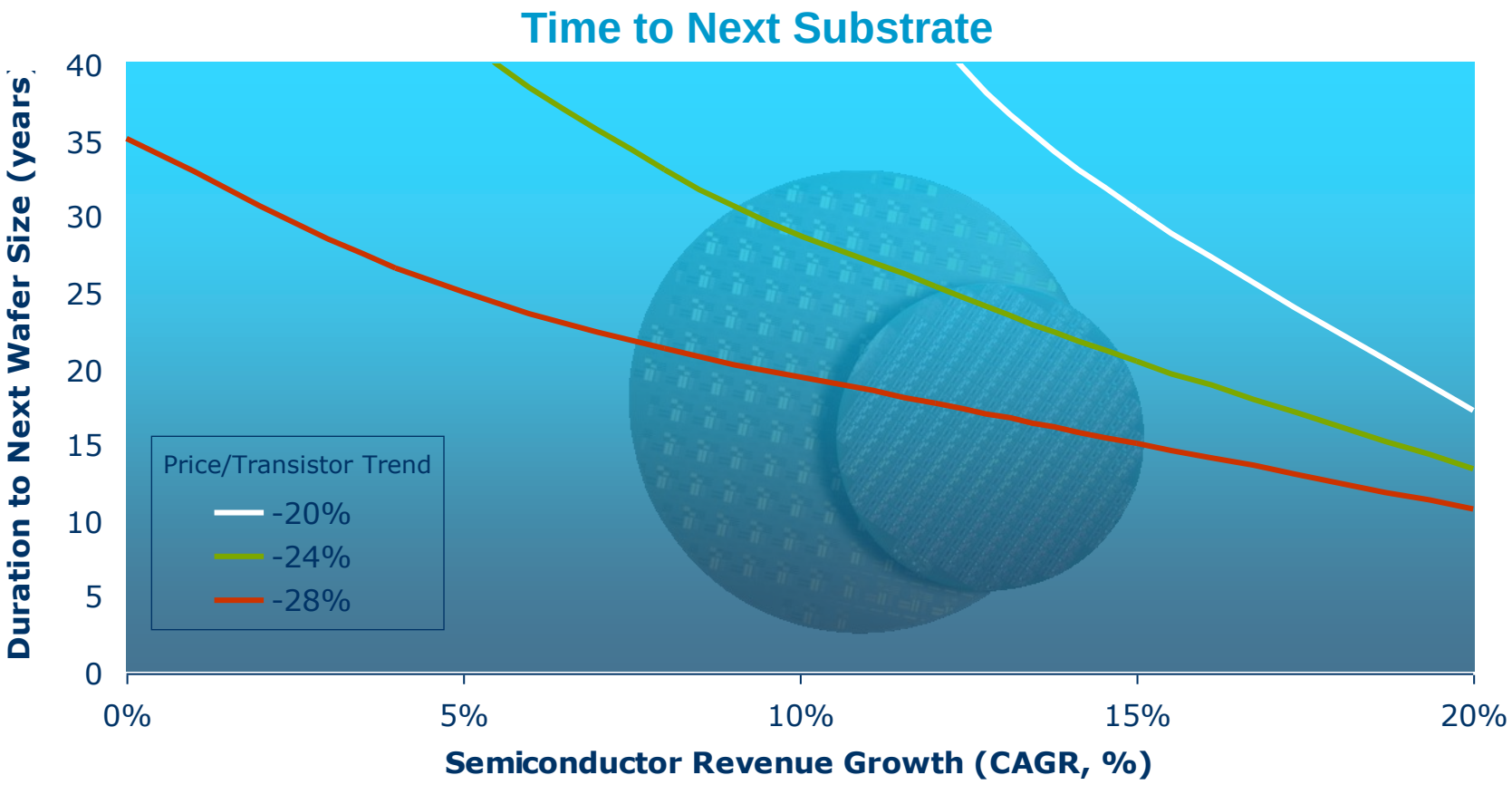
Economic Impact of Wafer Size Transition



Note: Year 3 of production, Leading Edge Memory

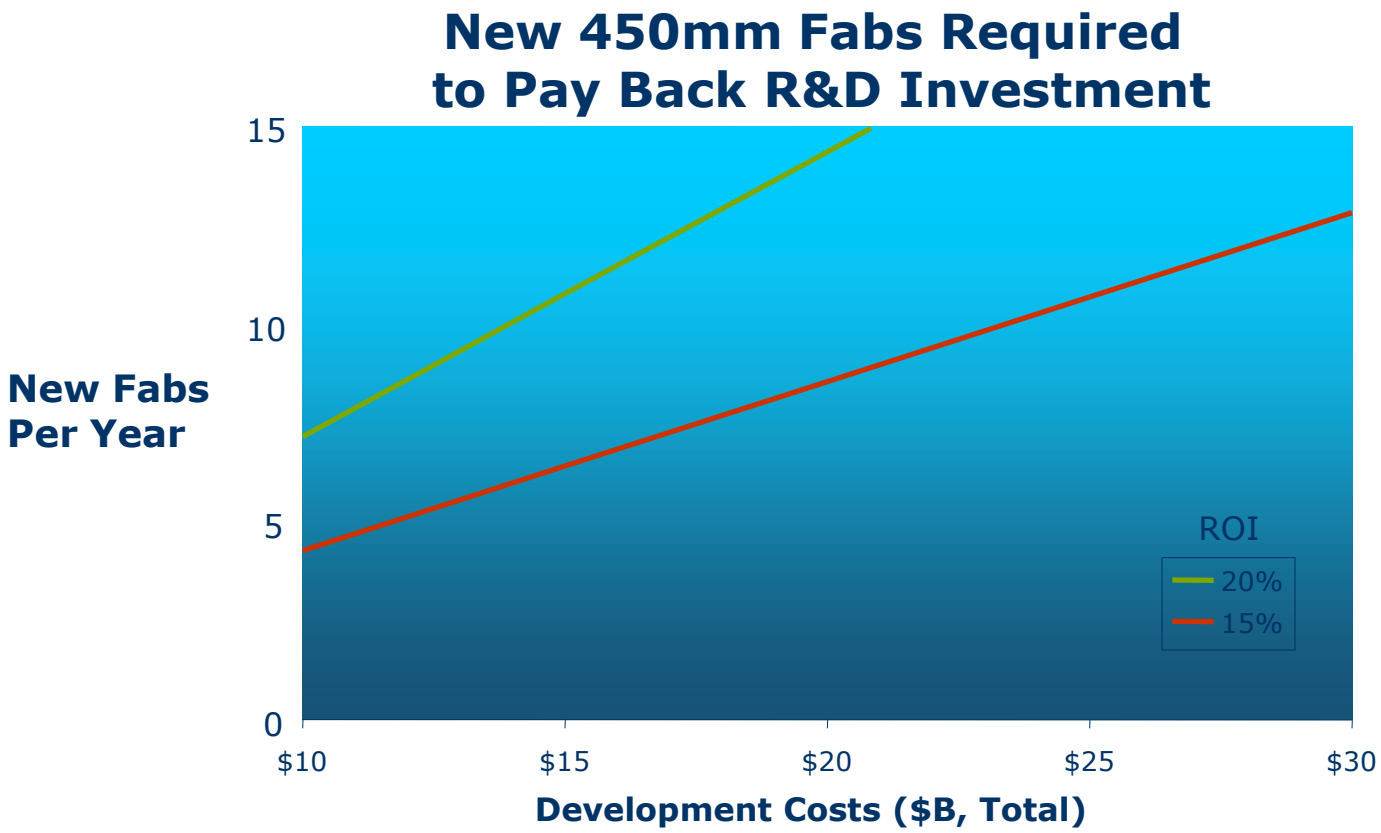
Source: Applied analysis of ISMI's Economic Model

Demand Drives Wafer Size Life Cycle



Assumptions: 450mm substrate; 3-year technology nodes; objective is to maintain constant number of fabs

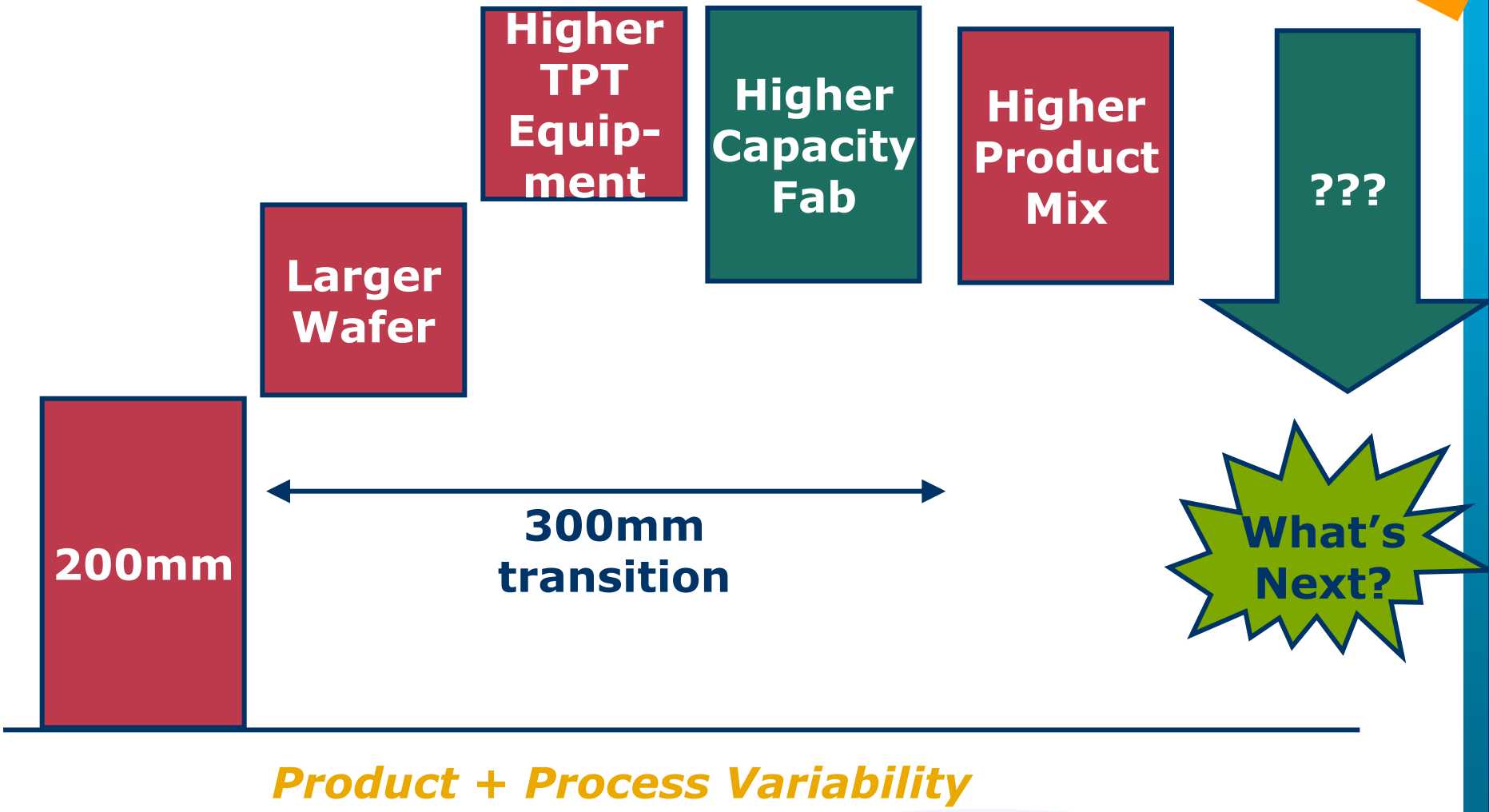
Broad-Based Adoption Required to Justify 450mm Investment



Note: Entire food chain modeled as a single entity earning back return on development funds through manufacturing cost savings; this investment may not be sufficient to allow suppliers to recoup investment

Managing Variability

Conceptual



Maximizing the Return on Fab Investment

Optimize fab operations

Build foundation of rapid, differentiated, technology solutions

- Extend Litho
- Enable transistor performance
- Scale interconnect RC
- Scale memory density (strain)
- Resolve nano defects

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