

Independent Study Project

— From Policy to Practice: How Deep Tech and AI Reshape Capital Flow

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Agenda

- **Intro & Policy Review**
- **Research Framework & Assumption**
- **Data Tagging & Analysis**
- **Strategic Patterns & Case Study**
- **Conclusion and Next Step**

Introduction & Policy Review

What Is This Project About & Why It Matters

- The U.S. is using **large-scale industrial policy** (CHIPS Act, IRA, Stargate) to reshape the **semiconductor industry**.
- This project investigates **how those policies direct capital** into semiconductor companies through investment and M&A.
- M&A is emerging as a key tool to execute policy goals—such as **supply chain resilience, technology control, and domestic production**.
- Understanding these trends helps explain **how federal strategy becomes market action**.
- This project connects **policy, capital flow, and deal activity** to reveal the new structure of the U.S. semiconductor ecosystem.
- Understanding **how capital reallocates** helps forecast M&A.

Recap: US Semiconductor Policy

CHIP and Science Act (2022)

- \$52.7B in direct grants, loans, and subsidies to boost U.S. semiconductor production.
- Targets **fab construction, packaging, and manufacturing equipment.**

Industry Fit



Chip Security Act (Draft, 2025)

- Focused on building a trusted and secure chip supply chain.
- Incentivizes acquisition of secure U.S. vendors to reduce export control and compliance risks.

Industry Fit



Star Act

- **25% tax credit** for semiconductor design expenses, like **internal R&D and IP licensing.**
- Complements CHIPS Act by shifting focus to **Fabless firms and design innovation** rather than physical manufacturing.
- Encourages onshore design capabilities, strengthening **upstream value chain** competitiveness.
- Strategic timing: Introduced in early 2025 to address lagging U.S. leadership in chip architecture and IP amid AI race.

Industry Fit



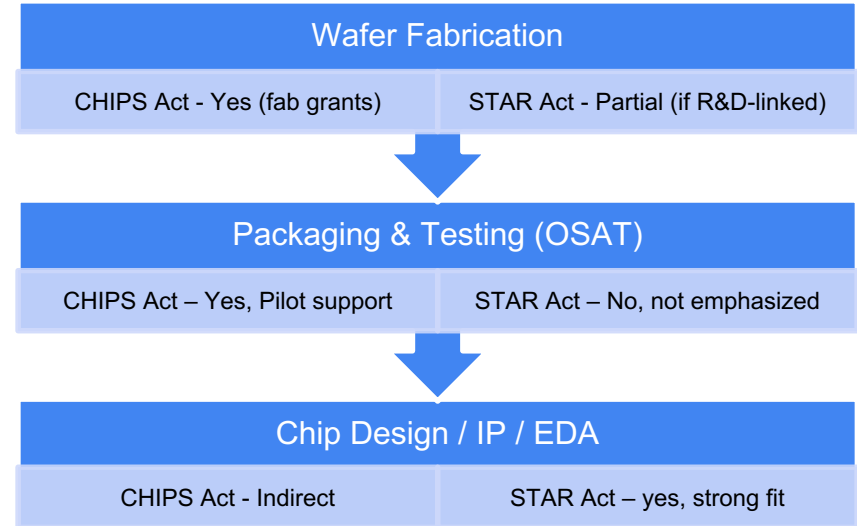
Policy Categorization & Application Differences

Administrative Process

- **CHIPS Act:** Slower, competitive—based on agency applications, reviews, awards.
- **STAR Act (Proposed):** Faster, automatic—tax credits claimed through IRS filings.

Accessibility

- CHIPS = Large, public, CapEx-heavy projects.
- STAR = Easier for SMEs/startups, R&D-focused entities.



Financial Accounting Impacts and Incentive Structures

R&D Expense Impact

- *CHIPS Act*: Sometimes offsets via grant
- *STAR Act*: 25% tax credit reduces P&L impact

Deferred Tax Assets

- *CHIPS Act*: No deferred tax asset
- *STAR Act*: Creates DTA → improves cash flow

Capital Grants

- *CHIPS Act*: Provides upfront capital funding
- *STAR Act*: No capital grant support

Income Effect

- *CHIPS Act*: Possible boost to "Other Income"
- *STAR Act*: No impact on operating income

CHIPS Act

- *Main Tool*: Direct grants, land/equipment support
- *Best For*: Foundries like Intel, TSMC, GlobalFoundries
- *Implication*: lowers capital intensity — ideal for fabs.

STAR Act

- *Main Tool*: 25% investment tax credit (IRC §48D)
- *Best For*: Fabless startups, EDA/IP companies
- *Implication*: improves tax efficiency — ideal for design/IP-heavy firms.

Chip Security Act*

- *Main Tool*: Compliance-linked vendor support
- *Best For*: Trusted players like SkyWater, domestic OSAT firms

Stargate (Private)

- *Main Tool*: Private capital for AI infrastructure
- *Best For*: Indirect beneficiaries like AI compute/cloud demand drivers

Initial Analysis and Assumption

“ Policy is reshaping capital structure and strategic orientation across the semiconductor value chain.”

The CHIPS Act is driving a wave of capital-intensive investment in domestic fabs and advanced packaging, incentivizing global foundries like TSMC to localize production. In parallel, the STAR Act supports capital-light expansion among fabless firms through R&D-focused tax credits, fueling M&A in semiconductor design, IP, and EDA.

“ Government incentives and private capital are increasingly aligned in shaping the industry’s future. “

Public subsidies are no longer acting in isolation, they're being matched by strategic private capital. This alignment is fostering new investment models that combine policy incentives with market-driven consolidation and innovation.

Vertical integration & IP acquisition

AI infrastructure deployment as a capital magnet

Cross-border market access & national security

Research Framework & Assumption

Major Framework Reference

*Companies maintaining competitive advantage under **changing policy or market conditions** engage in dynamic resource reallocation, including capital shifts and strategic acquisitions.*

*This resource reallocation is **key to value creation and sustaining growth in volatile environments***

McKinsey&Company

McKinsey Special Collection

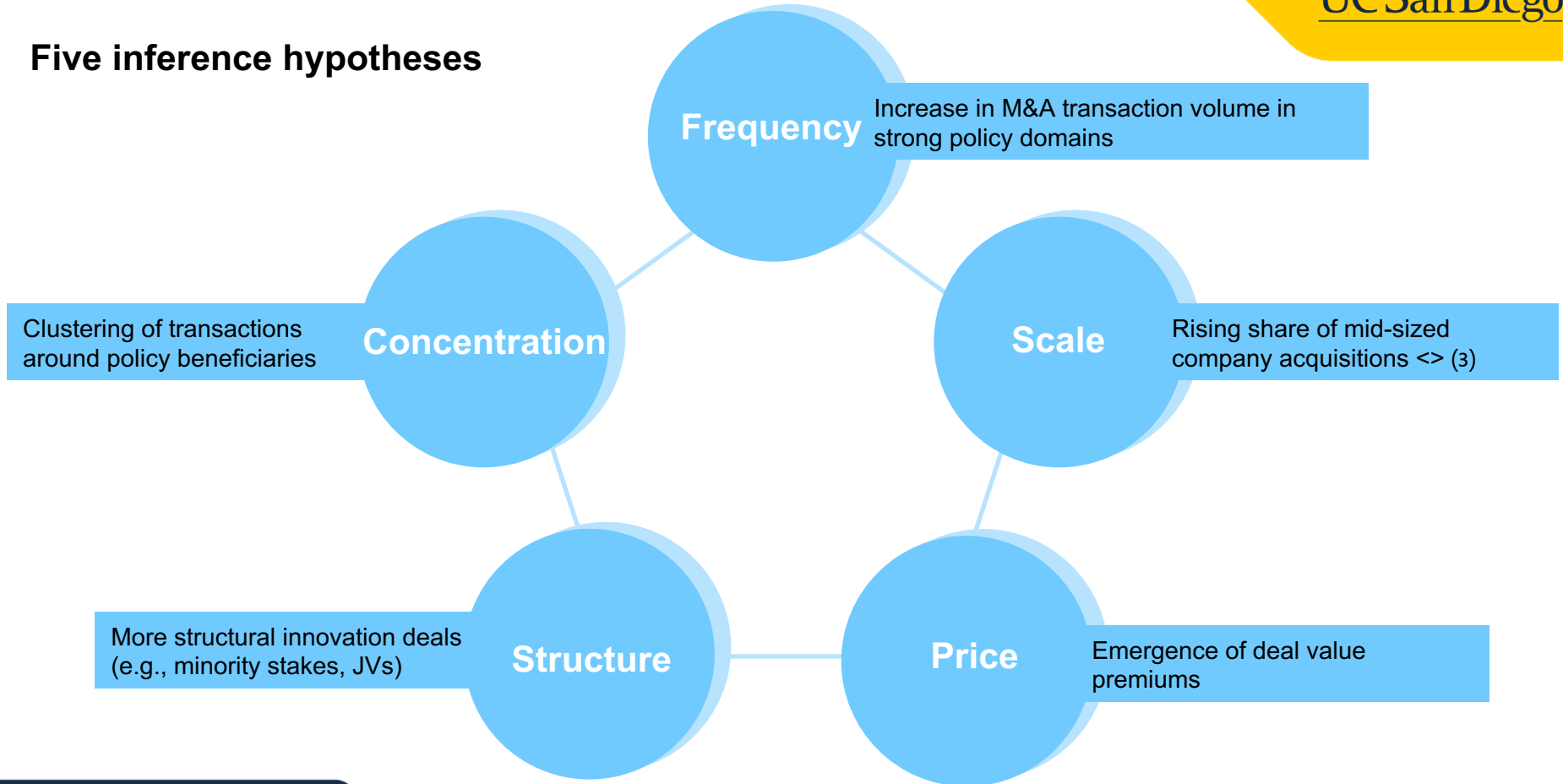
Resource allocation

Selected articles from the Strategy and
Corporate Finance Practice

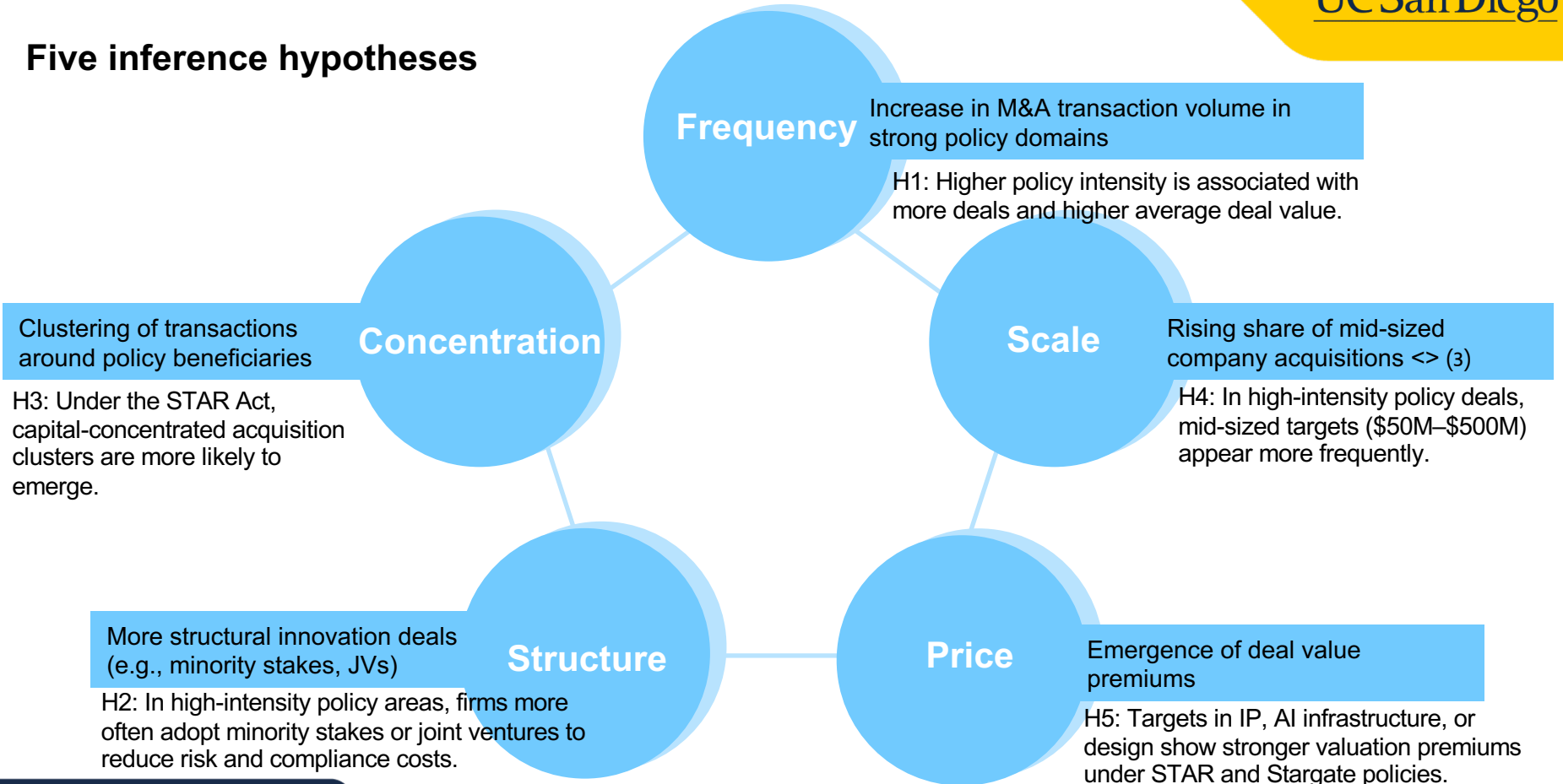
Behavior mechanisms: capital reallocation, structural innovation, and focused acquisitions



Five inference hypotheses

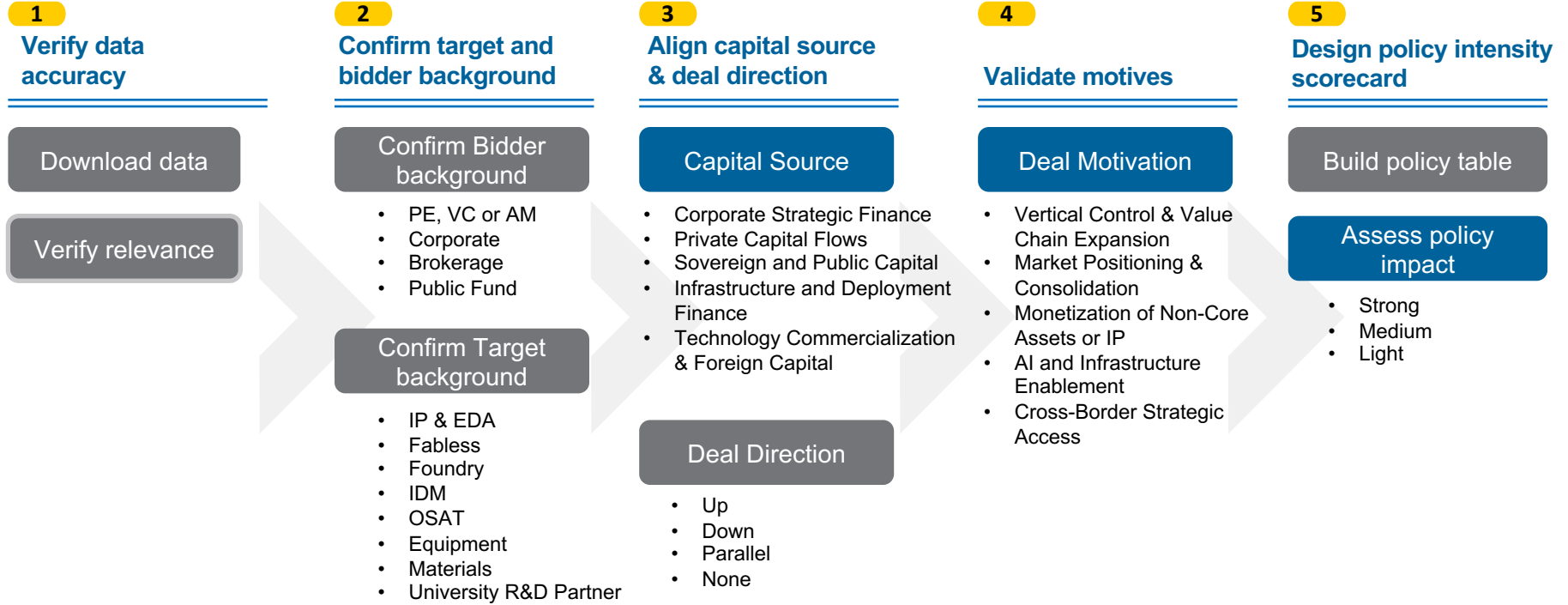


Five inference hypotheses



Data Tagging & Analysis

Data Analysis Process Overview



Step 3 Align Capital Source & Deal Direction: Capital Resource

- 1 Corporate Strategic Finance:**

These are typically internally driven decisions by corporates to vertically integrate, consolidate or refocus operations through asset sales.
Example Motives: M&A (A), CapEx (B), and Strategic Divestiture
- 2 Private Capital Flows:**

These represent market-based or syndicated investments, often used to acquire innovation capacity, especially in AI and semiconductor-related ventures.
Example Motives: VC/PE and Joint Ventures
- 3 Sovereign and Public Capital:**

These are state-backed or publicly listed capital injections used to scale strategic infrastructure (e.g., assembly, packaging) or expand design portfolios
Example Motives: Sovereign/Strategic Capital and Public Capital Raise
- 4 Infrastructure and Deployment Finance:**

These categories focus on operational enablement, including REIT-backed industrial finance and infrastructure-as-a-service (IaaS) models for AI deployment.
Example Motives: AI Infra Deployment and Tooling Capital Allocation
- 5 Technology Commercialization & Foreign Capital:**

These reflect cross-border or intangible asset strategies, with motives such as licensing revenue, tech transfer, and market access via FDI.
Example Motives: IP Monetization/Licensing and Inbound FDI

Step 4 Validate motives: Deal Motivation

- 1 Vertical Control & Value Chain Expansion**
Firms seek greater control over R&D, design, or fabrication by integrating upstream or downstream activities.
Example Motives: Vertical Integration, Design Licensing, Wafer Capability Expansion
- 2 Market Positioning & Consolidation**
Firms consolidate to reduce competition or improve market share through strategic CapEx or M&A.
Example Motives: Market Consolidation, Access to Local Market
- 3 Monetization of Non-Core Assets or IP**
Strategies to extract financial return from existing intangible or underused assets.
Example Motives: Technology Licensing, Divest to Refocus
- 4 AI and Infrastructure Enablement**
Transactions aimed at expanding physical or virtual infrastructure to meet AI workload demand.
Example Motives: AI Infra as a Service (IaaS), Risk Sharing / Talent Pooling
- 5 Cross-Border Strategic Access**
International investment with a focus on market entry, supply security, or alliance-building.
Example Motives: Access to Local Market, IP Transfer, Inbound FDI

Step 5 Design policy intensity scorecard: Assess policy impact

Design policy intensity scorecard



		Chip	Chip Security	STAR Act	Stargate	No	Bidder	Target	Chip	Chip Security	Star	Stargate	Chip	Chip Security	Star	Stargate
Target Background	IP & EDA	1	1	3	2	1	Advanced Micro Devices, Inc.	ENOSEMI, INC.	13	9	11	10	Strong	Medium	Medium	Medium
	Fabless	1	2	3	2	2	Okia Devices Corporation	Anadigm, Inc.	11	10	11	10	Medium	Medium	Medium	Medium
	Foundry	3	2	1	2	3	Incerto S.A.	Visual Semiconductor, Inc.	5	7	11	9	Light	Light	Medium	Medium
	IDM	3	2	2	2	4	UbiQD, Inc.	BlueDot Photonics, Inc.	12	10	9	9	Strong	Medium	Medium	Medium
	OSAT	3	2	0	2	5	Micros Components, Inc.	Integra Technologies Inc.	13	10	9	10	Strong	Medium	Medium	Medium
	Equipment	3	2	0	1	6	ASMedia Technology Inc.	Techpoint, Inc.	11	10	11	10	Medium	Medium	Medium	Medium
	Materials	2	2	0	1	7	ZelnicMedia Corporation	Pure Wafer Inc.	5	5	10	8	Light	Light	Medium	Medium
	University R&D Partner	2	1	3	3	8	Analog Devices, Inc.	Flux Logix Technologies, Inc.	13	9	11	10	Strong	Medium	Medium	Medium
	PE/VC/ AM	1	1	3	3	9	iGlobe Partners Pte. Ltd.; Diodes I	Fortemedia, Inc.	5	7	11	9	Light	Light	Medium	Medium
	Bidder Background	Brokerage	1	1	2	2	10	MACOM Technology Solutions Hol	ENGIN-IC, Inc.	11	10	11	10	Medium	Medium	Medium
Corporate		3	2	2	2	11	OEP Capital Advisors L.P.	Allegro MicroSystems, Inc.	6	5	11	9	Light	Light	Medium	Medium
Public Fund		2	3	1	2	12	Cyient Semiconductors Inc	Azimuth AI Inc.	12	10	11	10	Strong	Medium	Medium	Medium
Up		3	2	2	2	13	Radical Semiconductor, Inc.; BTQ	Assets and Technology Portfolio o	8	6	10	8	Medium	Light	Medium	Medium
Deal Direction	Down	2	2	2	2	14	Columbia Holdings, Inc.	T & E Industries, Inc.	9	7	8	7	Medium	Light	Medium	Light
	Parallel	2	2	2	2	15	Ceramic Products Group, Inc.	Criteria Labs, Inc.	14	10	9	10	Strong	Medium	Medium	Medium
	None	-	-	-	-	16	Artificial Electronics Intelligent Mat	Nisene Technology Group, Inc.	13	10	9	9	Strong	Medium	Medium	Medium
Capital Resource	Corporate Strategic Finance	3	2	2	2	17	GlobalFoundries Inc.; Tagore Tech	Proprietary and production-proven	13	9	11	10	Strong	Medium	Medium	Medium
	Private Capital Flows	1	1	3	2	18	Vishay Intertechnology, Inc.	Ametherm, Inc.	13	10	10	10	Strong	Medium	Medium	Medium
	Sovereign and Public Capital	2	3	2	3	19	Power Integrations, Inc.; Odyssey	:Assets of Odyssey Semiconductor	15	10	9	9	Strong	Medium	Medium	Medium
	Infrastructure and Deployment Finance	2	2	1	3	20	Odyssey Semiconductor Technolo	Substantially All Assets of Odysse	15	10	9	9	Strong	Medium	Medium	Medium
	Technology Commercialization & Foreign Capital	1	2	3	2	21	Exyte GmbH	CollabraTech Solutions LLC	13	10	9	9	Strong	Medium	Medium	Medium
Deal Motivation	Vertical Control & Value Chain Expansion	3	2	2	2	22	Sheng Bang Investment Corporat	Solid Silicon Technology, L.L.C.	9	8	9	8	Medium	Medium	Medium	Medium
	Market Positioning & Consolidation	2	2	2	2	23	Pear Tree Partners, LP; Qorvo, Inc	Anokwawe Inc.	4	5	12	9	Light	Light	Strong	Medium
	Monetization of Non-Core Assets or IP	1	1	3	2	24	ColdQuanta, Inc.	Morton Photonics Incorporated	15	10	9	9	Strong	Medium	Medium	Medium
	AI and Infrastructure Enablement	2	2	2	3	25	Kaynes Technology India Limited	Mixx Technologies, Inc.	13	10	11	10	Strong	Medium	Medium	Medium
	Cross-Border Strategic Access	2	3	2	2	26	KKR & Co. Inc.; KKR Group Partn	Transphorm, Inc.	7	7	10	9	Light	Light	Medium	Medium
						27	Cadence Design Systems, Inc.	Invecas, Inc.	11	9	11	10	Medium	Medium	Medium	Medium
						28	BluGlass Limited	GaNWorks Foundry, Inc.	14	10	9	10	Strong	Medium	Medium	Medium
					29	Novanta Corporation; Frontenac C	Bearing Engineers, Inc.	13	10	9	9	Strong	Medium	Medium	Medium	
					30	Anzu Partners, LLC; Anzu Industri	Pivotal Systems Corporation	6	5	10	8	Light	Light	Medium	Medium	
					31	Teradyne, Inc.; Technoprobe S.p.A	Device Interface Solutions Busine	13	10	9	9	Strong	Medium	Medium	Medium	
					32	Ultra Clean Holdings, Inc.	Hoffman Instrumentation Supply, I	13	10	9	9	Strong	Medium	Medium	Medium	
					33	CEVA, Inc.; Cadence Design Syst	Intrinsix Corp.	11	9	11	10	Medium	Medium	Medium	Medium	
					34	Soltron Devices, Inc.	Micro Engineering, Inc.	15	10	9	9	Strong	Medium	Medium	Medium	
					35	Wolfspeed, Inc.; MACOM Technol	The Radio Frequency Business of	13	10	9	9	Strong	Medium	Medium	Medium	
					36	Allegro MicroSystems, Inc.	Crocus Technology International C	13	9	11	10	Strong	Medium	Medium	Medium	
					37	Rambus Inc.; Cadence Design Sys	Rambus SerDes and memory inte	11	9	11	10	Medium	Medium	Medium	Medium	
					38	Marpos S.p.A.	Solaris Development Inc.	13	10	9	9	Strong	Medium	Medium	Medium	
					39	Stillwater Holdings LLC; Samsung	eMagin Corporation	7	7	9	8	Light	Light	Medium	Medium	
					40	Lumibird SA; Prima Industrie SpA	Convergent Photonics Italia S.r.l/C	13	10	9	9	Strong	Medium	Medium	Medium	

H1: Policy Intensity vs. Deal Volume & Value

Hypothesis:

Higher policy intensity is associated with more deals and higher average deal value.

Data Shows:

- 40+ deals with valid deal value.
- Strong policy scores (≥ 8) account for 33 deals with an average value of \$2.94B.
- Top 7 among them average \$9.26B.
- Lower policy scores (< 8) only show 7 deals, averaging \$3.63B.

Interpretation:

1. Strong policy environments clearly attract more deal activity.
2. Average deal size is not uniformly higher across all strong-policy deals; the distribution is skewed by a few very large transactions.
3. Suggests a “volume effect” rather than a consistent “premium effect”

Revised Hypothesis:

Policy intensity drives deal frequency more than consistent deal value premiums, with only top-tier transactions showing outsized valuations.

H2: Minority & JV Structures Under Chip Security / Stargate

Hypothesis:

In high-intensity policy areas such as Chip Security and Stargate, firms more often adopt minority stakes or joint ventures to reduce risk and compliance costs.

Data Shows:

- Only 3 cases of 100% or 0% stack acquisitions in strong-policy deals (Act Score 9, 9, 6).
- Majority of high-score deals (Score ≥ 8 , 43 deals) avoid full acquisitions.
- Minority/JV structures dominate in security-sensitive sectors.

Why < \$50M Targets Dominate:

1. High-regulation, high-scrutiny environments push firms toward collaborative entry strategies.
2. JV/minority stakes allow access to technology and subsidies while limiting approval risks.
3. Acquirers may prioritize flexibility and strategic footholds over full control.

Revised Hypothesis:

In policy-heavy and security-sensitive domains, JV and minority structures are the dominant entry mode, serving both as a hedge against compliance barriers and as a pathway to long-term strategic alignment.

H3: STAR Act & Capital Concentration (Clustering)

Hypothesis:

Under the STAR Act, capital-concentrated acquisition clusters (e.g., Cadence, Synopsys) are more likely to emerge

Data Shows:

- High STAR Act scores (≥ 9 , 43 deals).
- Repeat bidders (Power Integrations, Odyssey Semiconductor, BluGlass, ON Semi) appear only twice each.
- HHI concentration index ≈ 384 \rightarrow indicates low concentration (highly fragmented).

Why < \$50M Targets Dominate:

1. Contrary to hypothesis, no strong clustering effect is observed.
2. STAR-driven deals are dispersed across mid-sized and specialized firms, rather than dominated by a few giants.
3. Large incumbents (Intel, TSMC, Nvidia) appear to have pre-positioned, while STAR incentives mainly mobilize new entrants and niche players.

Revised Hypothesis:

Rather than clustering, STAR Act fosters a fragmented acquisition landscape, enabling diverse mid-tier players to participate instead of reinforcing dominance by industry giants.

H4: Vertical Control & Value Chain Expansion

Hypothesis:

In high-intensity policy deals, mid-sized targets (\$50M–\$500M) appear more frequently.

Data Shows:

- 20+ tracked deals with this motive
- Almost all targets < \$50M
- Few mid-sized (\$50–\$500M)
- None > \$500M

Why < \$50M Targets Dominate:

1. Capabilities, not Cash Flow: buyers seek IP, tools, engineering teams.
2. Lower Regulatory Risk: smaller deals avoid CFIUS scrutiny.
3. Subsidy Strategy: acquirer leverages CHIPS eligibility after integration.
4. Faster Time-to-Market: quick integration for CHIPS deadlines & AI cycles.
5. Build vs. Buy: faster, cheaper than building from scratch.

H5: Policy Urgency Drives Premiums for Small IP/AI Targets

Hypothesis:

Targets in IP, AI infrastructure, or chip design show higher valuation premiums when the deal is aligned with STAR or Stargate policies.

Data Shows:

- 77% of targets had < \$50M in revenue, yet were acquired under strong STAR/Stargate alignment
- All early-stage (<0.5Y) deals involved small companies (<\$50M)
- All mid-sized deals (\$50–500M) occurred >1 year after policy, likely due to regulatory or complexity delays
- 14 out of 22 deals (64%) occurred within 6 months of STAR/Stargate activity
- < \$50M + < 0.5Y = Fast-moving, policy-sensitive IP/design/AI acquisitions
- \$50–500M + > 1Y = Slower, more complex strategic M&A (e.g., platform integration)

Interpretation:

1. Buyers are paying valuation premiums for small, high-leverage IP/design companies
2. Policy creates urgency — firms secure key assets quickly to align with subsidy or tax credit eligibility

Policy Intensity Reshapes Deal Dynamics

Strong policy environments reshape M&A — shifting deal structures, targets, and timing. Instead of broad premiums, we see volume effects, minority/JV strategies, and fast IP-driven acquisitions under STAR and Stargate.

Volume Over Premiums

Strong-policy environments attract more deals, though only a few mega-deals skew average value.

Structure Innovation

Minority/JV structures dominate in sensitive sectors, balancing subsidy access with compliance risks.

IP & AI Valuation Premiums

Small, policy-aligned IP/design/AI infra firms (<\$50M) command fast-moving premiums, while mid-sized exits emerge later.

Strategic Patterns & Case Study

Case Study: TSMC Arizona – Hypotheses Proof

TSMC Arizona & Hypothesis 1 (Deal Size: Small vs. Mid-Sized)

- **Anchor fab effect:** TSMC's \$65B+ Arizona fabs (with up to \$6.6B CHIPS support) act as a **magnet for local ecosystem building**.
- **Observed behavior:** Instead of buying mid-sized (\$50M–\$500M) firms, ecosystem players target **small, <\$50M local firms** that provide:
 - Packaging & assembly (e.g., Amkor building new packaging plant in AZ)
 - Specialized materials (e.g., SiC, photonics startups)
 - Test & backend engineering services
- Confirms Hypothesis 1 — real-world vertical-control behavior favors *surgical, small acquisitions* around anchor fabs, not mid-sized firms.

TSMC Arizona & Hypothesis 2 (Valuation Premiums under Policy Alignment)

- **Early wave (<0.5Y):** Local contractors, tool suppliers, and specialty materials firms moved quickly to integrate into the fab → consistent with **small, fast-moving, policy-sensitive assets** that tend to carry valuation premiums.
- **Later wave (>1Y):** *Amkor's advanced packaging facility* in Arizona represents a **mid-sized, strategic, capital-heavy commitment**, consistent with slower, more complex M&A seen under policy alignment.
- **Premium effect:** Even small Arizona-based firms gained **outsized strategic value** once TSMC Arizona was underway, since being part of the fab ecosystem meant **eligibility for CHIPS-linked funding and long-term contracts**.

Case Study: Stargate Initiative – Hypotheses Proof

Stargate & Hypothesis 2 (Minority / JV Structures in Security-Heavy Domains)

- **Anchor initiative effect:** Stargate links NSF/DoD funding with private partners (OpenAI, Microsoft, Cerebras, universities). The mix of federal oversight + national security requirements raises compliance costs.
- **Observed behavior:**
 - Firms enter through collaborations, minority stakes, and consortia, rather than direct acquisitions.
 - Emphasis on joint infrastructure (labs, compute access) instead of ownership-heavy deals.
- **Conclusion:** Confirms H2 — in high-security, defense-linked policies, JV/minority entry is preferred to reduce political, approval, and integration risks.

Stargate & Hypothesis 3 (Clustering vs. Fragmentation)

- **Anchor initiative effect:** Integration with CHIPS/STAR intended to create a cohesive U.S. AI-compute backbone.
- **Observed behavior:**
 - Multiple players across academia, startups, and hyperscalers participate.
 - No evidence of consolidation around a few large incumbents; instead, capital is spread across diverse contributors.
- **Conclusion: Rejects H3** — Stargate fosters a fragmented ecosystem, mobilizing many specialized participants rather than concentrating capital in a small set of giants.

Conclusion

Project Conclusion

Project Key Takeaway

Industrial policies (CHIPS, STAR, Stargate) are reshaping capital allocation, creating new incentives for semiconductor and AI sectors.

1

Built a structured framework linking policy intensity → capital/resource adjustment → deal design, generating five testable hypotheses.

2

Tagged ~80 deals across policy alignment, capital source, deal motive, and structure; validated hypotheses with quantitative evidence and revised interpretations.

3

Findings reveal volume-driven deal surges, rise of JV/minority stakes, and valuation premiums in small IP/AI infra firms; supported by real-world cases (TSMC Arizona, Stargate).

4

Learning Experience: Knowledge Gap

- 2nd Order Contribution:**
 Examines how policy intensity shapes M&A behavior through mechanisms such as capital reallocation, JV structures, and valuation premiums. We link policy → resource adjustment → deal design, filling the gap on how policy affects translate into market actions.
- 3rd Order Evidence:**
 Case studies (TSMC Arizona, Stargate) serve as contextual validation, illustrating how these mechanisms operate in real-world settings.

Interesting News Follow up

OpenAI plans Stargate expansion outside US

Global spending on artificial intelligence infrastructure with partners is expected to be 'above and beyond' \$500bn target at home



OpenAI said it would work with traditional US allies to promote 'democratic artificial intelligence' © FT montage/Getty Images

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