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Digital Sovereignty: Can Europe Afford It?

di Nicklas Lundblad

Imagine Europe wakes up tomorrow, and every American tech company vanishes — poof! What breaks? Everything from the cloud infrastructure running government services, to the smartphones in people's pockets, and the chips in cars rolling off assembly lines. Europe would need to replace the hardware layer, the software layer, the services layer, and, crucially, the innovation layer that keeps generating new technologies.

Let's do a so-called Fermi approximation and cost out the component parts of tech independence. As we will see, the price will prove prohibitive. Instead of pursuing a quixotic plan to detox from US tech, Europe needs to weave a tapestry of strategic partnerships that no single thread can unravel.

Start with semiconductors, since they're the atoms of the digital world. Europe currently produces about 10% of global chips. The US, Taiwan, South Korea, and China dominate. The Commission proposes a Critical Raw Materials Act to catch up.

Building state-of-the-art semiconductor fabs? Taiwan's TSMC spent at least $40 billion (€34 billion) on advanced facilities in Arizona. Europe would need, conservatively, a dozen such facilities to achieve genuine autonomy across different chip types. That's €408 billion ($480 billion) just for fabs. But wait — you also need the entire supply chain: materials processing, packaging facilities, testing equipment. Add another €200 billion ($233 billion).

The running total? Let's say somewhere around €680 billion ($791 billion).

Next, consider operating systems and productivity software. Microsoft Office, Windows, Adobe's Creative Suite, and Google represent decades of iterative development, countless person-hours, and network effects that make them sticky.

Let's be wildly optimistic and say a crash program could achieve in 10 years what took 30 years in the US. Microsoft spends about $30 billion (€26 billion) annually on R&D. Adobe spends around $3 billion (€2.5 billion). From March 2023 to March 2024, five tech firms spent $229 billion (€197) on R&D. If we multiply even one company's annual R&D by 10 years, you're looking at an investment of €300 billion ($349 billion) over a decade to reach competitive parity.

Let's turn to the cloud and artificial intelligence. Here's where it gets expensive. Amazon Web Services, Microsoft Azure, and Google Cloud represent hundreds of billions in capital expenditure for data centers, networking, and software.

Google DeepMind has hundreds of top researchers. OpenAI raised tens of billions. Meta spent over $30 billion (€26 billion) on AI infrastructure in 2024 alone. For Europe to match the current capabilities of US big tech in cloud and AI, it would cost €500 billion ($582 billion) minimum over a decade.

Now think about all the services built on top: mapping (Google Maps), video (YouTube), social platforms, messaging, search engines, and app stores. Each represents billions in development and operates at scales that require massive ongoing investment.

Rough estimate for building European alternatives that people would actually use: €200 billion ($233 billion).

But wait — that's just technology. What about *talent*? Here's the really tricky bit — the part that makes this more than just an engineering problem. Silicon Valley didn't emerge because of capital alone. It's an evolutionary ecosystem where certain cultural conditions, risk tolerance, failure acceptance, and talent density create a self-sustaining innovation engine.

Let's say Europe needs to attract and retain 500,000 additional top-tier tech workers over a decade. The salary and opportunity cost differential (people choosing European startups over US tech firms)? Perhaps $50,000 (€42,963) per person per year on average. That's $250 billion (€215 billion) over ten years, from companies that do not quite exist yet.

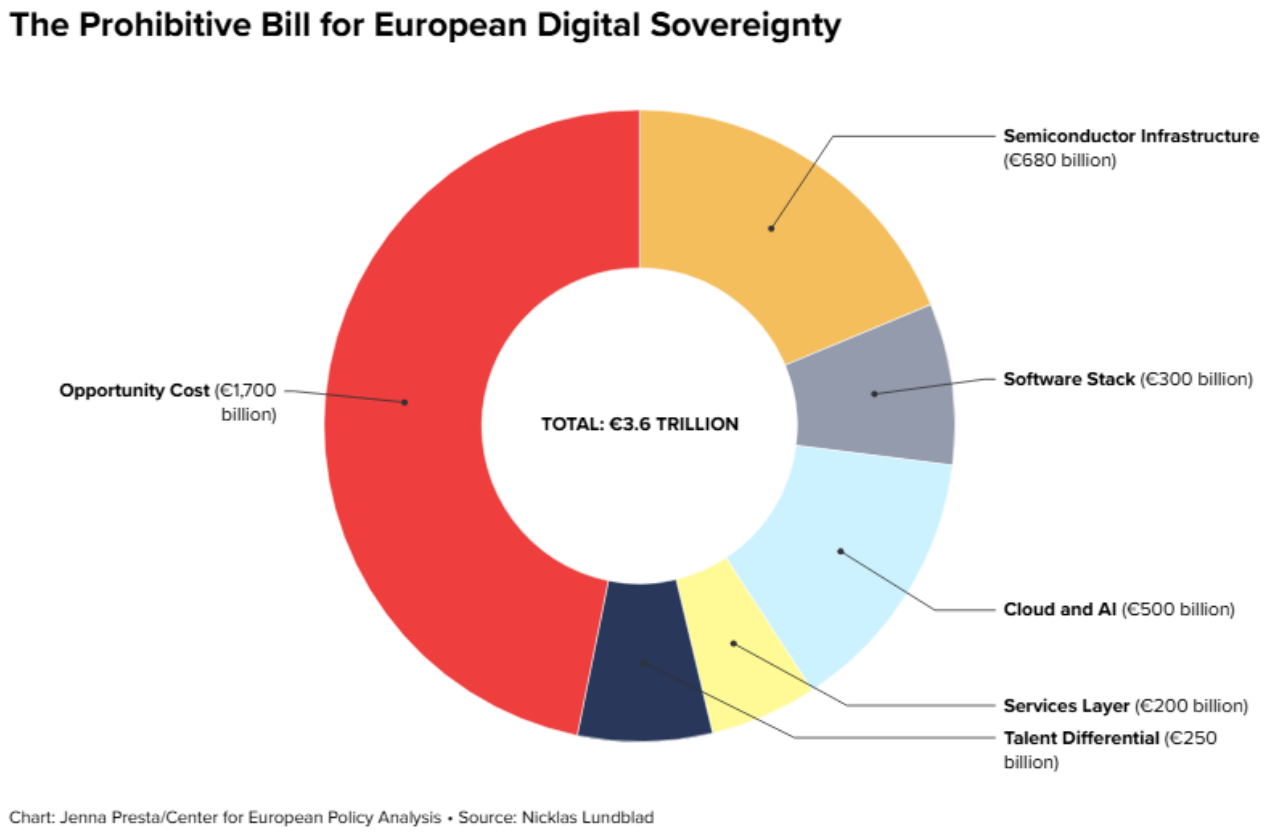
And there's a hidden cost we haven't counted: while Europe builds all this, US companies don't stand still. They improve, iterate, and create new markets. Every year of lag might cost another percentage point of GDP as European companies use inferior tools, infrastructure, and services.

For an economy of roughly €17 trillion ($19.8 trillion), a 1% annual competitiveness drag over 10 years equals €1.7 trillion ($1.9 trillion) in lag cost.

Let's total our back-of-napkin calculation:

- Semiconductor infrastructure: €680 billion ($791 billion)
- Software stack: €300 billion ($349 billion)
- Cloud and AI: €500 billion ($582 billion)
- Services layer: €200 billion ($233 billion)
- Talent differential: €250 billion ($215 billion)
- Opportunity cost: €1.7 trillion ($1.9 trillion)

Grand total: Roughly €3.6 trillion (about $4.19 trillion at current rates).



To put these figures in perspective, that is equivalent to about 20% of Europe's annual GDP, spent over a decade. That's more than France's entire annual economic output.

The Commission's "Independence Moment" rhetoric misidentifies the problem. Europe's vulnerability isn't dependence itself — it's *concentrated* dependence on a handful of actors whose interests may diverge unpredictably.

The solution simply can't be building a €3.6 trillion fortress of technological self-sufficiency. It should instead forge resilient partnerships. Ties with US states create multiple channels resilient to US federal whiplash. Joint ventures with India's booming tech sector split costs while building mutual capability. Trade frameworks with ASEAN's fast-growing Asian countries position Europe as the standards-setter for digitizing economies seeking alternatives to Chinese infrastructure or American platform dominance. Redundancy through diversification beats isolated strength every time.

Economics tells the story. Complete independence costs ten times more than strategic network-building, and that calculation doesn't even capture the opportunity costs of going it alone. For roughly €300 billion ($349 billion) over a decade — invested in joint research facilities, coordinated standards bodies, co-investment funds, and institutional capacity (open up public procurement!) for partnership orchestration — Europe could position itself as an indispensable node connecting multiple tech ecosystems.

The continent should shape how different tech ecosystems integrate, looking outward, not inward. When US states need regulatory frameworks that work across the Atlantic, when India seeks partners for semiconductor development, when Southeast Asian nations digitize their economies, Europe could choose to become an architect of the research programs and standards.

This partnership model represents genuine resilience. You cannot recreate Silicon Valley through sheer spending, no matter how many zeros you add. But you *can* create conditions where European cities become places where Indian engineers, American researchers, and African entrepreneurs want to collaborate. You can make Europe the place where different technological traditions meet and hybridize. That's a comparative advantage that no amount of semiconductor fabs can buy — the advantage of being trusted, curiosity-driven ground where different players can build together.

In the coming years, the real test of leadership is whether Europe's politicians can resist the emotional appeal of "independence" and embrace the hard work of strategic interdependence. Independence sounds strong; partnership sounds weak. But ask yourself: which is more fragile, a fortress with walls you must constantly defend, or a network where you're the hub that everyone needs? Europe's "independence moment" might actually be a moment of *interdependence*.

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Technical Appendix

Executive Summary

Self-Sufficiency Path: €3.6 trillion (10 years)

- Direct investment: €1.93 trillion
- Catch-up penalty: €1.7 trillion

Strategic Partnership Path: €300 billion (10 years)

Cost Ratio: ~10:1 advantage for partnerships

Scope: Meaningful resilience (Europe at ~20% of critical technology markets with viable alternatives), not total autarky.

1. Semiconductors: €680 billion

Semiconductors

Component	Amount
Leading-edge fabs (10 facilities, 5nm-2nm)	€280 billion
Advanced packaging	€40 billion
Mature nodes (28nm-180nm)	€70 billion
Equipment & tools	€80 billion
Metrology & inspection	€20 billion
Materials supply chain	€35 billion
R&D facilities	€45 billion
Subtotal	€570 billion
ASML advantage (Europe already owns EUV monopoly)	€70 billion
Contingency (10%)	€40 billion
Total	€680 billion

Table: Center for European Policy Analysis • Source: Nicklas Lundblad

Calculation: With costs at $27.5 billion per advanced fab complex, our estimate of €25.5 billion (at 1.10 FX) is conservative.

Context: Independent estimate of €1 trillion ($1.16 trillion) to achieve complete autonomy; our €680 billion ($791 billion) estimate targets 20% market share.

Primary Sources

- TSMC Corporation, Form 6-K Filing, March 4, 2025
- S. Helmrich, Kiel Institute for World Economy, May 2022

2. Software Stack: €300 billion

Software Stack

Component	Amount
Operating systems (desktop, mobile, server)	€80 billion
Productivity suites	€50 billion
EDA tools (chip design software)	€60 billion
Development environments	€25 billion
Enterprise applications	€35 billion
Database & middleware	€30 billion
Ecosystem standards	€15 billion
Contingency	€5 billion
Total	€300 billion

Table: Center for European Policy Analysis • Source: Nicklas Lundblad

Context: Microsoft alone spends $32.5 billion (€27.9 billion) annually. Our entire 10-year estimate is 10x one company's annual R&D.

Scale: €208 billion ($242 billion) annually from five firms; our 10-year total is 1.44x their single year.

Primary Sources

- Microsoft Corporation, Form 10-K FY2025, July 2025
- TrendlineHQ, Big Tech R&D Analysis, June 2024

3. Cloud & AI: €500 billion

Cloud & AI

Component	Amount
GPU/AI accelerators (1M H100-equivalent)	€140 billion
General servers (5M units)	€70 billion
Networking infrastructure	€35 billion
Data centers (60 facilities)	€85 billion
Cooling systems	€20 billion
Power infrastructure (15 GW total)	€80 billion
Contingency	€70 billion
Total	€500 billion

Table: Center for European Policy Analysis • Source: Nicklas Lundblad

Context: AWS alone invested €70.6 billion in 2024; therefore, our €500 billion estimate for European hyperscalers is a comparable, if not conservative, estimate.

Scale: Five companies are spending €150 billion annually; European competitors need similar infrastructure.

Primary Sources

- Amazon.com Inc., Form 10-K FY2024, February 2025
- Dgtl Infra, Cloud & Hyperscale CapEx Report, May 2024

4. Services Layer: €200 billion

Services Layer

Component	Amount
Search engine	€30 billion
Mapping & navigation	€25 billion
Video platform	€50 billion
Social networks	€40 billion
Messaging	€20 billion
App stores & payments	€20 billion
Contingency	€15 billion
Total	€200 billion

Table: Center for European Policy Analysis • Source: Nicklas Lundblad

Excludes: Content moderation (€20-50 billion), creator payments (€100-250 billion), licensing.

Context: Google and Meta spent a combined $91.7 billion (€78.7 billion) in 2024 for global services; European alternatives at a regional scale require substantial ongoing investment.

Primary Sources

- Alphabet Inc., Form 10-K FY2024, February 2025
- Meta Platforms Inc., Form 10-K FY2024, February 2025

5. Talent Differential: €250 billion

Requirement: Retain 500,000 technical specialists competing against Silicon Valley Salaries.

Calculation:

- *Average salary differential: €50,000/year*
- *Duration: 10 years*
- *Gross cost: €250 billion*

Two-Tier Breakdown

Tier	Headcount	Differential	10-Year Cost
Top decile (AI/chip experts)	50	€120-150k/year	€60-75B
Bulk technical workforce	450	€40-60k/year	€180-225B

Table: Center for European Policy Analysis • Source: Nicklas Lundblad

Validation: US tech wages are roughly 40-60% higher than wages in Europe across all roles. The salary and opportunity cost differential (people choosing European startups over US tech companies) is perhaps $50,000 per person per year on average.

Primary Sources

- Levels.fyi, European Tech Compensation Report 2024-2025
- U.S. Citizenship and Immigration Services, H1B Wage Data FY2024

6. Opportunity Cost/Catch-Up Penalty: €1.7 trillion

Concept: While Europe spends 10 years building infrastructure, competitors advance 3+ technology generations. European firms use inferior tools, falling further behind.

Calculation:

- *Baseline EU GDP: €17 trillion (2025)*
- *Productivity drag during build: -1% annually*
- *Why: 500,000 engineers building infrastructure instead of products; European companies using generation-behind technology.*
- *Cumulative GDP gap (10 years, NPV @ 3%): €1.7 trillion*

Example Timeline:

Year	Without program (2% growth)	With program (1% growth)	Gap
2026	€15 trillion	€15 trillion	-€150 billion
2030	€16 trillion	€16 trillion	-€470 billion
2035	€18 trillion	€17 trillion	-€1.02 trillion

Table: Center for European Policy Analysis • Source: Nicklas Lundblad

Primary Sources

- OECD, Digital Economy Outlook 2024
- McKinsey Global Institute, Economic Potential of Generative AI, June 2023

Application: Our 1% drag is the center of the observed range (0.8-1.5 percentage points) for countries falling behind in digital infrastructure according to the OECD Digital Economy Outlook.

Warning: Winner-takes-most dynamics prevail; laggards face exponential divergence.

Partnership Alternative: €300 billion

Strategy: Diversified independence through multiple partnerships — preventing any single actor from cutting Europe off.

Three Tiers

Tier 1: Minimum Sovereignty (€100 billion)	Tier 2: Diversified Partnerships (€150 billion)	Tier 3: Ecosystem Development: €50 billion
Purpose: Insurance if partnerships fail	Purpose: Multiple redundant sources	Purpose: Reduce proprietary lock-in
2-3 European fabs at critical nodes Core cybersecurity infrastructure	Co-investments with TSMC, Samsung, Indian fabs Cloud federation (EU-US states, EU-India, EU-ASEAN) Joint AI research facilities	Open-source software at scale Standards bodies

Table: Center for European Policy Analysis • Source: Nicklas Lundblad

Scaling: Industrial open source costs €30-50 billion compared to €300 billion for proprietary development.

Why This Works

Dimension	Self-Sufficiency	Partnerships
Cost	€3.6 trillion	€0.3 trillion
Time to capability	10-15 years	3-5 years
Technology currency	Generation-behind	Current
Resilience	Single point of failure	Multiple sources

Table: Center for European Policy Analysis • Source: Nicklas Lundblad

Primary Sources

- TSMC Arizona + U.S. CHIPS Act: $165 billion (€141 billion) investment made by TSMC plus $11 billion (€9.43 billion) in government support shows that the co-investment model reduces per-partner costs by 3.5 times.
- Linux Foundation Annual Report 2024

Summary Table

Category	Direct Investment	Catch-Up Penalty	Total
Self-Sufficiency			
Semiconductors	€680 billion		
Software	€300 billion		
Cloud & AI	€500 billion		
Services	€200 billion		
Talent	€250 billion		
Subtotal	€1,930 billion		
Catch-up penalty	—	€1.70 trillion	
Total Self-Sufficiency	€1.93 trillion	€1.70 trillion	€3.63 trillion
Strategic Partnerships	€300 billion	~€50 billion	€350 billion
Advantage Ratio	6.4:1	30:1	~10:1

Table: Center for European Policy Analysis • Source: Nicklas Lundblad

Methodology

Conservative Assumptions

- Targets 20% market share (EU Chips Act goal), not 100%
- Uses the lower end of cost ranges (11th-30th percentiles)
- Benefits from existing ASML monopoly (€60-100 billion European advantage)

- Excludes many ancillary costs (i.e., content moderation, creator payments, licensing)

What We're Costing

- Meaningful resilience (viable European alternatives across critical technologies)
- NOT total autarky, which would cost €5-10 trillion or more

Limitations

- Order-of-magnitude estimates for strategic planning
- Costs could vary ±40% based on execution
- Partnership path requires diplomatic stability

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