POLICY ESSAY

Europe's AI Challenge Is Not Technological — It Is Economic

Why competitive location conditions matter for Germany's and Europe's AI strategy

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Executive Summary

Europe needs powerful artificial intelligence and technological sovereignty. Long-term success, however, will depend equally on competitive location conditions. This essay combines insights from regional economics with the current geoeconomic debate and argues that energy, industrial data, human capital and innovative capacity will be decisive for Europe's future as an AI location

Key messages

- Technological sovereignty alone is not enough.
- AI leadership is also a competition between locations.
- Germany's industrial data and hidden champions are strategic assets.
- Human capital is the most important AI infrastructure in the long run.

Introduction

Europe's debate on artificial intelligence is increasingly framed around a single question: can the continent achieve technological sovereignty in AI?

The discussion is understandable. Artificial intelligence is emerging as a general-purpose technology with far-reaching economic, political and security implications. A region that becomes entirely dependent on foreign AI providers risks losing strategic autonomy and economic influence.

Yet a more fundamental question is often overlooked:

Why should AI companies choose Europe in the first place?

From the perspective of firms' location decisions, this is the central challenge. For decades, research on firm location decisions has shown that companies do not invest where political ambitions are strongest. They invest where long-term competitive conditions exist. Capital follows incentives.

This distinction matters because Europe's AI debate is increasingly shaped by geoeconomic concerns. The pandemic, the Russia-Ukraine war, supply-chain disruptions, semiconductor shortages and growing US-China rivalry have all highlighted the risks of strategic dependencies. Calls for European AI sovereignty are therefore understandable.

But strategic importance does not automatically translate into economic competitiveness. Even as strategic autonomy moves up the political agenda, firms continue to base investment decisions on the quality of underlying location conditions.

The critical issue is not whether Europe should pursue greater technological autonomy. It is whether Europe can build and sustain competitive advantages across key segments of the AI value chain.

A successful AI strategy must therefore be not only technologically ambitious but also economically viable.

Investing into innovative capacities

This does not mean Europe should abandon efforts to develop powerful foundation models.

The strongest argument for European foundation models is not sovereignty alone. It is innovation.

Building large-scale AI models creates capabilities that extend far beyond a single product. Organisations that train frontier models learn how to operate large-scale computing infrastructure, optimise advanced chips, manage complex data pipelines and scale AI systems efficiently. These capabilities generate knowledge spillovers throughout the broader economy.

If Europe relies entirely on foreign-developed foundation models, some of these technological capabilities may gradually disappear or never emerge in the first place. Developing at least a limited number of globally competitive models is therefore not only a question of sovereignty but also an investment in future innovative capacity.

Moreover, foundation models are increasingly becoming a form of general-purpose infrastructure. Businesses, universities, hospitals, engineering firms and public administrations are likely to depend on advanced AI systems in much the same way they depend today on cloud computing or telecommunications networks. For that reason alone, maintaining domestic capabilities matters.

Competitiveness begins with location conditions

The question, however, is not whether Europe should have its own AI capabilities. The question is whether the continent offers the conditions necessary for these capabilities to emerge and scale.

Energy is one of those conditions.

Modern AI infrastructure is highly energy-intensive. Large data centres increasingly consume electricity on a scale comparable to small cities. Research has repeatedly shown that energy costs influence investment and location decisions.

Studies by Matthew Panhans, Lucia Lavric und Nick Hanley demonstrate that electricity prices affect firm relocation decisions, particularly in energy-intensive sectors. Research by Aurélien Saussay und Misato Sato similarly finds that differences in energy costs influence the geographical allocation of industrial investment.

These findings are difficult to ignore in a sector where computing power and electricity have become strategic inputs.

Europe faces a structural challenge. The US benefits from lower energy costs, deeper capital markets and well-established technology ecosystems. China combines scale, state coordination and rapid infrastructure deployment. Europe competes against both.

Nor is energy the only concern. Access to venture capital, the ability to scale rapidly and the broader regulatory environment will all shape the future geography of AI investment.

The global competition for AI leadership is therefore not only a race for algorithms. It is a competition between locations.

A continental strategy, not a national one

Europe should also resist the temptation to view AI strategy through a purely national lens.

If energy becomes an increasingly important input into AI infrastructure, different regions of Europe possess different comparative advantages. The Nordic countries benefit from abundant low-carbon electricity, stable grids and favourable climatic conditions for data centres. Other regions

possess strong research ecosystems, industrial clusters or concentrations of specialised manufacturing firms.

A successful European AI strategy will therefore require specialisation rather than duplication. Not every country needs to host every stage of the AI value chain. Data centres may emerge where energy is abundant and affordable, while AI applications may develop where firms, universities and industrial users are concentrated.

One of Europe's strengths is precisely this diversity. The challenge is not to replicate the same capabilities everywhere, but to connect complementary strengths across the continent.

Europe’s overlooked advantage

Yet focusing exclusively on data centres and foundation models risks obscuring Europe’s most distinctive asset.

The US dominates platform data. Europe possesses something different: industrial data.

European manufacturers, chemical companies, automotive firms and medical technology companies have accumulated decades of operational, engineering and production data. These datasets are often highly specialised, difficult to replicate and closely linked to real-world industrial processes.

Whether future value creation will primarily accrue to foundation models or to applications built on top of them remains uncertain. But it is increasingly clear that competitive advantage will also depend on domain expertise and proprietary data.

This is where Europe may hold an underappreciated advantage.

The competitive advantage may therefore lie not only in the model itself, but in access to unique industrial data. A model trained to optimise online advertising cannot simply be transferred to industrial applications. AI for energy systems, wind farms, chemical plants or factory production lines requires entirely different data and domain expertise.

The continent is home to thousands of highly specialised firms that are global leaders in narrow industrial niches. Germany’s so-called Hidden Champions are perhaps the best-known example, but similar companies exist across Europe. Their strength lies not in scale alone, but in deep technological and engineering expertise, long-term customer relationships, and unique knowledge and datasets accumulated over decades.

Yet they rarely feature prominently in the public debate on AI. The discussion continues to revolve around foundation models and technology giants, even though much of Europe's competitive advantage may lie elsewhere.

The most promising European AI strategy may therefore not be to replicate Silicon Valley. It may be to combine advanced AI with Europe’s existing industrial strengths.

The real question is not whether Europe builds the next ChatGPT. It is whether Europe can become the global leader in AI applications for manufacturing, energy, healthcare and engineering, while preserving its strategic autonomy.

Human capital is the real infrastructure

The long-term bottleneck may not be computing power at all.

It may be talent.

If industrial data, engineering expertise and AI become increasingly intertwined, Europe will need professionals capable of operating at the intersection of technology, economics and geopolitics.

Universities will need to educate not only computer scientists, but also engineers, economists and data scientists who understand industrial value chains, economic competitiveness and the geopolitical context of technological change while being able to use modern machine learning and AI tools.

In the end, Europe's most important AI infrastructure may not be the data centre. It may be the lecture halls.

Europe will increasingly depend not only on AI specialists, but on professionals capable of combining artificial intelligence with economic reasoning, industrial know-how, and an understanding of geoeconomic change.

A realistic path forward

Europe will need its own foundation models to preserve innovative capacity, technological competence and strategic flexibility.

But Europe's greatest opportunity may not lie in outspending the US or outscaling China.

It may lie in combining AI with what Europe already does exceptionally well: advanced manufacturing, industrial expertise, specialised data and world-class human capital.

The future of European AI will not be determined solely in research labs or data centres. It will be determined wherever firms choose to locate and invest, innovate and build competitive advantages that can endure.

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