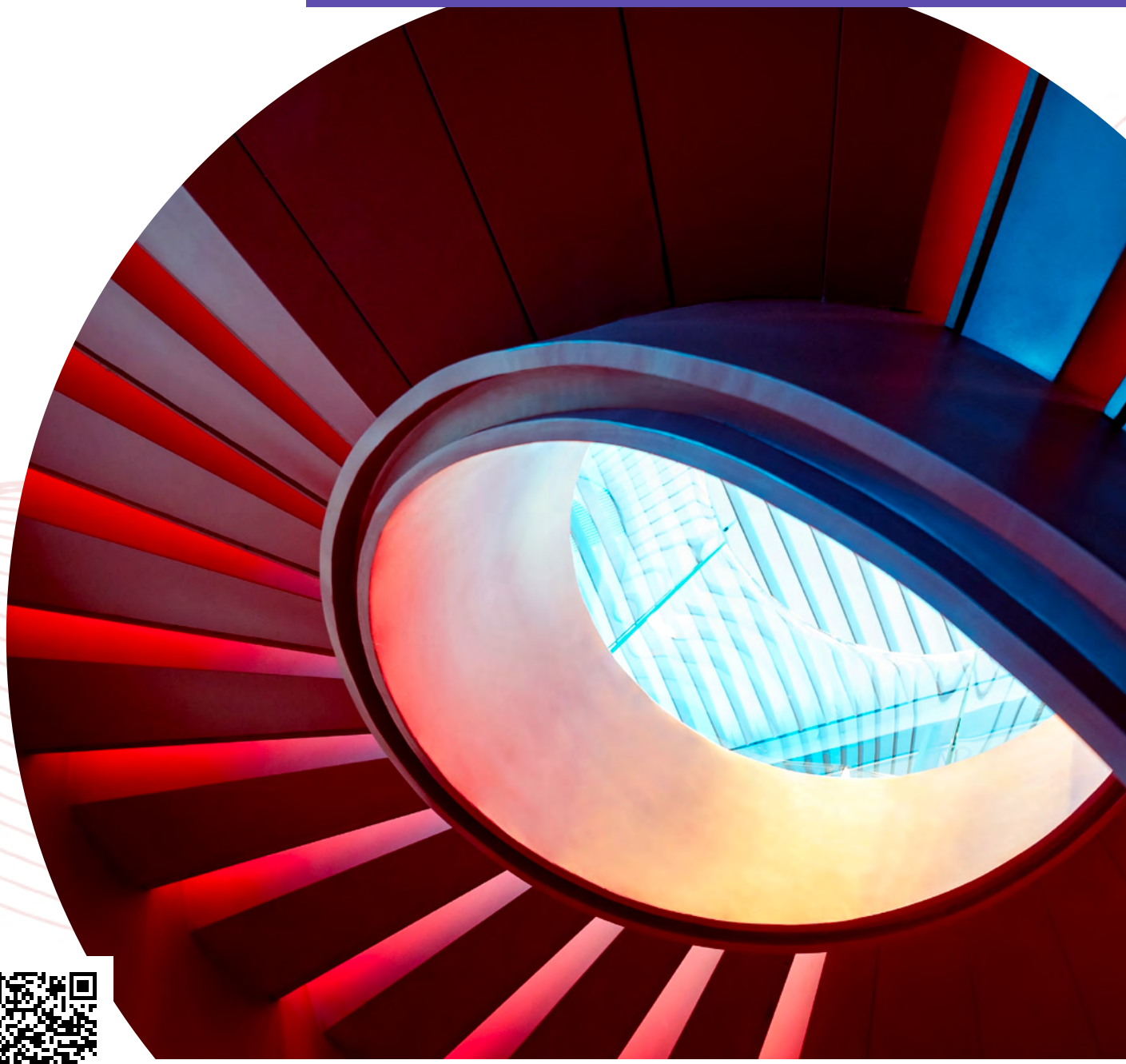
POLICY STUDY
August 2026

HOW CAN EUROPE'S MISSING MIDDLE BE FINANCED?

TRANSLATING CHINESE LESSONS FOR SCALING INDUSTRIAL INNOVATION

Cornel Ban



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EXECUTIVE SUMMARY

Europe's industrial predicament is increasingly defined by its inability to turn technological innovation into globally significant industrial firms that could, in turn, ensure high-quality employment for Europe's workers for the decades to come. While European universities, engineers and firms continue to generate major breakthroughs in sectors such as batteries, advanced manufacturing, clean energy and industrial technologies, the continent repeatedly fails to carry these innovations through the "missing middle" of industrial scale-up: the capital-intensive **hypertransformation** phase where industrial superscalers are built. As a result, Europe often invents frontier technologies and brings them to the stage of commercial validation, while competitors invest in and industrialise them rapidly and at scale, capturing long-term economic advantages while Europe loses its edge and, worryingly, large parts of its industrial base along with it. It is hardly a sign of industrial health that European firms increasingly plead for protectionism against Chinese imports that are not only cheaper, but often more technologically advanced and innovative.

Indeed, China increasingly resembles a continent-sized innovation machine, organised around dense innovation-industrial ecosystems, giving birth to industrial superscalers or firms that successfully move beyond technological innovation and early commercialisation to achieve very-large-scale industrial production, ecosystem control and global market dominance in capital-intensive sectors. The country became so effective at transitioning from patents to superscalers that it alarmed Western policymakers enough to implement export controls and technology restrictions.

This pivot in the global economy has taken place, in large part, because China has effectively solved the problem the Draghi report called the second valley of death: the gap where promising industrial innovations fail to scale into commercial production. By 2025, it had mobilised **€790 billion** in subscribed capital through industrial government guidance funds. By 2025, China had established 2,023 industrial government guidance funds (a form of government venture capital with scale-up functions) with a cumulative target size of €1.27 trillion, of which €790 billion had been subscribed via these dedicated equity-based instruments taking technical innovations from scale-up to industrial champions in some cases. The figure represents more than double of the total amount of equity, grants, loans and guarantees that the entire EU ecosystem (not just dedicated scale-up instruments) have committed by 2025 (€304.25 billion). However stricter apples-to-apples comparison using only the EU's dedicated scale-up equity tools (€28 billion) plus an estimated share of €70 billion for equity in the European Competitiveness Fund allocation would put the true gap closer to €692 billion against subscribed capital in China's guidance funds.

This EU-China equity gap and, more importantly, the way China targets this financial firepower complicates conventional wisdom. Current debates about a "China Shock 2.0" tend to fixate on China's scale, its repression of domestic consumption to achieve record-high investment and familiar industrial policy instruments such as subsidies, while neglecting the implications of the country's far more entrepreneurial investment state, as realised through the imbrication of government guidance funds into China's innovation and industrial economy. The result of this analytical neglect is an unnecessarily narrow understanding of the options available to the EU as it confronts its own industrial decline. This matters because that decline is being driven by more than high energy prices, demanding regulation, market fragmentation and Sino-American mercantilism. At a moment of unusually rapid technological change, Europe is held back, above all, by its comparatively weak capacity to build a system capable of mobilising public and private capital at scale, not merely to catch up with Chinese industrial leaders but to leapfrog them. The challenge is existential for European industry and comes as a shock to experts sceptical of vertical industrial policy in general and China's dirigiste developmentalism in particular.

Europe spent decades looking at the USA, seeking to replicate "Silicon Valley" effects in Europe. Yet Europe's key export sector is not digital technology but manufacturing, and manufacturing innovation needs a different kind of finance to scale up than digital innovation does. The policy study therefore

looks for lessons in the world's largest industrial economy and, recently, biggest source of industrial superscalers. What haunts European industrialists and workers most is not so much US digital giants but Chinese industrial giants like BYD, Unitree or CATL with strikingly short histories.

China's rise as an industrial superscaler economy (and Europe lagging behind it) illustrates how aligned scale-up finance, infrastructure, procurement and industrial policy can create globally significant firms, whereas Europe's fragmented governance structures, diffuse funding models and weak coordination mechanisms continue to leave many of its most promising industrial innovators unable to scale domestically. Europe's lagging performance in this regard has grim consequences for the future of Europe's quality employment, government revenue, welfare state and general wealth. Indeed, Europe is at a historical fork in the road that stands to make the socio-economic status quo quite untenable in the medium term.

The evidence analysed in the policy study first unpacks **China's innovative approach for** deploying its innovative and modular forms of state-directed government venture capital, particularly its government guidance funds, to bridge financing gaps at both the early and late stages of taking industrial startups across the "second valley of death" into growth and hypergrowth phases that underpin China's industrial dominance in sectors once associated with European leadership, a phenomenon increasingly described as the "second China shock".

The policy study then examines **Europe's response** to this challenge and finds it poorly suited not only to the defensive task of building resilience, but also to the more ambitious objective of leapfrogging China's numerous industrial superscalers that Europe has no effective response to. If industrial Europe is to compete successfully with industrial China, a scenario vastly preferable to escalating geoeconomic conflict, Europe will need to learn *selectively yet systematically* from China's experience and adapt those lessons to Europe's own political and institutional realities. The implication that follows is not that Europe should replicate China's model. The political and institutional differences run too deep, and the trade-offs are too significant. Yet European policymakers can benefit from learning that China's rise to a technological juggernaut owes a great deal to the bespoke financial scaffolding that accompanied this country's technological innovators on their path to becoming the superscalers that now put large swathes of industrial Europe out of business, largely based on their own technological know-how. To this end, the policy study proposes the following suggestions for Europe:

- **Expand and better coordinate state-owned scale-up financing at the EU and member-state levels:** Europe's main weakness is not startup creation but the absence of sufficiently large pools of patient capital capable of financing firms through the hyperscaling phase in capital-intensive sectors. To date, in terms of capital already committed to dedicated EU-level scale-up financing instruments, identifiable figures amount to slightly above €10 billion while in terms of intended financing capacity, with the combined target size of the instruments, they reach approximately €28 billion. This is less than some of the individual Chinese guidance funds, of which China has many.

  China demonstrates the importance of large and multi-cycle financing vehicles controlled by central and local authorities, able to deploy very large tickets, defend positions through follow-on rounds and support firms continuously from early growth to industrial scale. However, China's most important lesson for the EU is that for state-controlled capital to have the desired effects across both early- and late-stage financing cycles, one needs extremely high levels of coordination across levels of government, sectors and subsectors targeted. Indeed, money itself is not the only issue for Europe. Both the dedicated and broader European scale-up financing model remains fragmented across different governance structures within the EU level of analysis and between this and the member state and regional levels in terms of investment approaches and sectoral mandates.

In short, Europe needs not just more government scale-up capital but the capacity to orchestrate and plan across levels of supranational, national and regional governance, as well as orchestrate public and private actors from both financial and industrial spheres.

- **Concentrate scale-up financing:** Europe does not have China's capacity to direct finance at chosen industries because the EU and state ownership in finance is much more limited. Additionally, the EU cannot mobilise as high an investment as a share of GDP as that in China, where consumption remains locked at much lower levels, a democratically improbable outcome in European democracies. These should be strong incentives to stop spreading widely the more limited EU and state-owned financial capital for scale-up purposes. The key insight emerging from the comparison is that, even with its vast directed financial resources, China became a "superscaler" factory by concentrating extraordinary quantities of capital into a relatively small number of strategic sectors and value chains rather than distributing funding diffusely across technologies and territories.

- **Connect universities and public venture capital more systematically:** Chinese university-linked venture ecosystems connect frontier research, spin-offs, public finance and industrial scaling in a relatively continuous chain. Europe possesses world-class public research institutions, but commercialisation ecosystems at scale remain isolated to a handful of universities, suggesting the need for stronger institutional bridges between universities and risk capital.

- **Mobilise state-owned enterprises (SOEs) as sources of scale-up capital:** China shows how SOEs can function as major providers of patient capital for state investment funds targeting strategic technologies. The share of SOEs is much lower in Europe and European SOEs have much greater operational autonomy. Still, relative to the USA, EU member states already possess substantial SOE balance sheets, but these remain weakly coordinated and only marginally connected to innovation finance, limiting their role in supporting industrial transformation at scale. The lack of appetite to encourage EU-based SOEs to become equity investors in scale-up funds no longer fits the current reality in which large swathes of Europe's industry, including its crème-de-la-crème in automotive, electronics or machine tools, are increasingly unable to stand up to highly innovative Chinese superscalers in open competition.

1. INTRODUCTION

1.1 Hypertransformation and Europe's scale-up finance gap

The EU's industrial predicament is increasingly defined by a specific failure: the inability to turn technologically innovative startups into globally powerful industrial firms. This is not a failure of innovation itself. European universities, engineers and research institutions continue to generate major breakthroughs in batteries, semiconductors, advanced manufacturing, clean energy and industrial technologies. Nor is it a failure of basic capital availability. Europe possesses enormous financial wealth across pension funds, development banks and national governments. The failure is more precise and more consequential: Europe cannot finance the phase where firms transition from technological validation to industrial scale. This missing phase is called hypertransformation.

Hypertransformation is the road from startup to global industrial champion, where firms must simultaneously navigate four interdependent pressures that multiply execution risk. First, firms must reconfigure entire value chains around new manufacturing paradigms. Second, they must adopt and master technologies at scales previously untested. Third, they must execute hypergrowth while building factories, securing supply chains and navigating regulatory environments. Fourth, they must absorb enormous capital requirements over long periods before stable profitability materialises. These four pressures do not stack linearly. They interact multiplicatively. A firm can have brilliant technology yet fail because it cannot raise capital large enough for the scaling phase. It can secure funding yet fail because regulations shift. It can build factories yet fail because supply chains collapse. Hypertransformation is where many of Europe's most promising industrial innovations stall, get acquired by foreign competitors or are commercialised elsewhere.

The consequence is *chronic industrial erosion*, the consequence of which is that European firms increasingly plead for protectionism against Chinese imports that are not only cheaper but often more technologically advanced. Manufacturing job losses accelerated sharply in 2025, increasing threefold compared to 2022. This is not because European innovation has declined. It is because Europe's competitors learned to finance and orchestrate hypertransformation more effectively. In this regard, China's approach for scaling up finance reveals what Europe is missing. Since the 2010s, China has built a comprehensive architecture specifically designed to carry firms through hypertransformation. Government guidance funds (GGFs) operate as part of a broader integrated system linking policy banks, local governments, industrial ministries, state-owned enterprises (SOEs) and public procurement in a coordinated chain. Within this chain, firms can move from early-stage venture support into sustained, multi-stage financing capable of carrying them through extended periods of unprofitable scaling in strategically prioritised sectors. By 2019, Chinese scale-ups had raised $337.3 billion, 2.7 times more than their European counterparts, representing 1.34% of GDP in China versus 0.53% in the EU. Between 2013 and 2018, China's scale-up financing velocity was more than double that of Europe's (Li and Ban 2026). This gap did not emerge because China has better scientists. It emerged because China built financial institutions and governance mechanisms specifically designed to finance hypertransformation at scale.

The central argument of this study is straightforward: Europe's scale-up problem is not a capital shortage but an institutional coordination failure. The EU and its member states have money. The EU alone can theoretically make more than €260 billion available for scale-up financing (more than half that of committed Chinese GGF capital) if one factors in the wider EU financing architecture and if all of it

were converted into scale-up financing proper (see the Appendix), rather than the current €28 billion targeted for the three dedicated EU instruments: the Scaleup Europe Fund; the European Tech Champions Initiative (ETCI); and the European Competitiveness Fund (ECF). The main problem is that even dedicated funds remain poorly focused sectorally and cover companies at different stages, thus lacking the single, strategically directed pool of capital comparable in coherence, concentration or discretion to the largest state-backed investment structures found in China. What Europe needs, then, is not necessarily more money, but more equity-based scale-up financing and the institutional architecture capable of concentrating, coordinating and strategically directing scale-up capital through the extended time horizons and systemic complexity that hypertransformation demands. Understanding this distinction is critical given the assumption made in this study that it is politically unlikely in the current climate that the EU-level scale-up financing envelope can be increased.

The policy study contains three major sections. The first examines hypertransformation as a phenomenon specific to capital-intensive manufacturing sectors and traces why traditional venture capital (VC) models designed for software and biotech fail to finance it effectively. This section establishes the financing problem empirically by showing the divergence between European and Chinese scale-up capital flows and the consequences for industrial outcomes. The second section examines how China's GGFs evolved as instruments specifically designed to bridge scale-up finance gaps, tracing the institutional architecture through which GGFs coordinate public and private actors, align financing with demand-side policies, and support firms through extended scaling phases. This section documents what an integrated scale-up finance system looks like in practice. The third section examines why Europe's approach to scale-up finance remains fragmented despite possessing substantial financial resources and sophisticated public institutions. It identifies the specific coordination failures preventing Europe from leveraging its existing capital and institutions more effectively: fragmentation across member states; regulatory silos; divergent political mandates; and the design of public financing institutions oriented toward de-risking and catalytic investment rather than direct orchestration of scaling ecosystems.

The study focuses deliberately on capital-intensive deep-tech sectors. These sectors matter for three reasons. First, they share financial characteristics that distinguish them from software or biotech. They require long development timelines, sustained capital deployment over years before profitability, complex supply-chain coordination, regulatory navigation and infrastructure development. Manufacturing innovation is not digital innovation. Second, these sectors play critical roles in Europe's export profile and technological competitiveness with China. Europe cannot compete based on software platforms against the USA or China. It can potentially compete based on advanced manufacturing and industrial technology if it solves the scaling problem. Third, these sectors are where Europe's innovation advantage most visibly fails to convert into industrial advantage. European labs lead in battery chemistry and manufacturing. European patents dominate lithography equipment design. European engineers innovate in renewable energy systems. Yet the subsequent scaling, industrialisation and ecosystem control increasingly occur elsewhere.

This is not a call to replicate China's system, which operates through governance mechanisms that Europe neither possesses nor desires. It is a call to recognise that scale-up finance in capital-intensive sectors requires institutional coordination that Europe's current fragmented approach cannot provide. Europe needs four things:

1. sufficiently large pools of patient capital deployed at multiple stages coordinated across public and private actors;

2. concentration of that capital into strategically chosen sectors rather than diffuse deployment across numerous initiatives;

3. institutional mechanisms connecting universities and industrial scaling through dedicated commercialisation institutions; and

4. integration of scale-up capital with regulatory alignment, demand-side policies and supply-chain coordination.

The remainder of this study details what each of these requirements entails and how the EU might construct such institutional architectures within its political constraints.

1.2 Organisation and research design

The policy study examines China's scale-up model first, detailing the architecture of government-guided funds; policy banks; and multi-level coordination linking finance, production and demand. It identifies core mechanisms and acknowledges system limits. It then maps Europe's government-backed VC landscape, documenting fragmentation, early-stage bias and weak scale-up capacity. The comparative section identifies Europe's "missing middle". The conclusion outlines how selected features could adapt to EU constraints.

The case selection prioritises China over the USA for three reasons. First, the USA and Europe compete in different sectors. The USA dominates digital services and platforms while running a persistent manufacturing deficit with the EU. American VC excels at scaling software and network effects but offers limited guidance for batteries, machinery or clean technology. Europe's problem is not building Silicon Valley. It is scaling industrial innovation under global competition. Second, the USA possesses structural advantages that Europe cannot reproduce: dollar hegemony, unified capital markets and global savings inflows. These underpin a venture ecosystem financing large-scale growth with liquid public exits. Europe lacks these conditions and cannot substitute for them through policy reform. Third, the EU and China share more similar growth models than either shares with the USA (Baccaro et al. 2022). Both are export-led manufacturing economies with comparative advantage in industrial goods and embedded technology. The USA operates a consumption-driven service economy. Jonas Nahm demonstrates this rigorously: American firms lose scaling races to Chinese competitors not from innovating less but because financial infrastructure carrying manufacturing innovation from prototype to deployment does not exist in service-oriented economies with consumption, tech and commodity-led growth engines such as the USA (Nahm 2021). In other words, the USA does not compete in sectors where scaling problems bite hardest. Europe does, so China provides the more relevant growth-regime comparator.

1.3 Hypertransformation finance

Hypertransformation refers to conditions where hard-tech firms must scale whilst navigating four interdependent pressures: value-chain reconfiguration; large-scale technology adoption; hypergrowth execution; and high capital intensity (Sorensen and Hojmark 2026). These pressures interact multiplicatively, generating compounded execution risk even with viable technology. Many industrial companies fail not from weak innovation but from an inability to coordinate production growth, funding and ecosystem building simultaneously. When these pressures collide, firms burn cash for extended periods, struggle with supplier coordination and encounter regulatory barriers. Even promising firms cannot attract financing designed for digital startups. Europe needs coordinated demand-side policies; patient capital; nimble financing instruments; and stronger integration between firms, states and markets. Yet European financial systems and policies are designed for software companies, not for building factories and supply chains. Without this shift, regions with strong technological and industrial capacity risk falling behind because they cannot turn innovation into large-scale production.

Post-2008 Basel frameworks heavily incentivised European banks towards capital preservation and risk management. Long-duration technological bets consume regulatory capital and generate uncertain returns. In May 2026, Claudia Buch, chair of the European Central Bank's (ECB's) supervisory board, stated that lowering capital requirements would "put the resilience of the euro

area banking sector at risk".[1] Banks therefore prefer collateralised lending, stable cash flow or sovereign guarantees. Unlike Chinese policy banks, they are not embedded within centralised industrial strategy where losses in strategic sectors may be politically tolerated for long-term technological gains. The European Union lacks the vertically integrated Chinese developmental chain linking policy banks, local governments, industrial ministries, SOEs and procurement systems. Once a sector becomes nationally strategic in China, firms access coordinated state-backed finance, carrying them through prolonged unprofitable scaling. European firms encounter discontinuity precisely at that stage. Europe's scale-up problem cannot be reduced to insufficient capital. The issue is organisational coordination and risk socialisation. Even public institutions such as the European Investment Bank (EIB) and European Investment Fund (EIF) operate through de-risking logic, co-financing and catalytic investment rather than directly orchestrating industrial scaling ecosystems. Large European banks operate within competitive shareholder-driven systems and fragmented national regulatory environments, whereas Chinese banks remain embedded within party-state governance structures where the People's Bank of China, SASAC, the NDRC and industrial ministries collectively steer credit towards Five-Year Plan priorities through relending facilities, political signalling and administrative coordination. European central banks lack equivalent developmental mandates, and national governments cannot easily impose them within the EU framework.

China coordinates value chain, finance, production and demand through a state-led and state-owned finance apparatus (Ban and Hasselbalch 2025; Larsen 2025a; Larsen 2025b; Li and Ban 2026; Saltmarsh 2026; Jackson and Larsen 2026a; 2026b). This system can carry firms through prolonged unprofitable scaling in strategically prioritised sectors because all actors respond to shared signals embedded in Five-Year Plans and centralised priorities. Europe fragments these four circuits across member states, regulatory silos and uncoordinated state financial institutions, even when individual components function adequately (Mertens and Thiemann 2022; Lepont and Thiemann 2024). The problem is not absent capital but absent institutions capable of concentrating and politically directing capital toward uncertain long-term industrial transformation. This helps explain why EU increasingly frames its challenge as one of "strategic investment gaps", despite possessing enormous aggregate financial wealth. The underlying institutional difference – whether financial actors operate within coordinated strategic frameworks or within fragmented commercial and regulatory environments – determines whether capital can actually reach firms during hypertransformation or whether they stall, relocate or get acquired by competitors operating within more integrated systems.

1.4 Industrial Europe: Strong on innovation, weak on escaping industrial incumbency

One of the more revealing contrasts in today's industrial landscape sits in the age profile of leading firms. Many of China's most formidable companies in sectors Europe considers strategic are barely a decade or two old. BYD has moved from batteries into electric vehicles and become a global contender. CATL, founded in 2011, now dominates large parts of the global battery supply chain. LONGi scaled into a world leader in photovoltaics within a similarly short timeframe. These firms did not emerge from a century-long accumulation of capabilities. They were accelerated into existence through dense coordination of finance, policy and demand.

Europe presents a very different picture. Its industrial strength rests on companies with origins that stretch back decades, often more than a century. Siemens, Bosch, Volkswagen and Novo Nordisk remain globally competitive, but they are products of an earlier industrial era. Even Europe's most celebrated high-tech firm, ASML, dates back to 1984. Newer industrial firms exist, but they rarely reach comparable global scale, with cases like Northvolt still in the process of building capacity rather than dominating markets. The contrast raises a deeper question. Europe continues to produce world-class science and engineering, yet it struggles to

translate that into a steady pipeline of new industrial champions. Many promising firms plateau, get acquired or scale elsewhere.

Overall, European innovation and industrial policy lack robust mechanisms for governing hypertransformation's nonlinear complexity. Existing frameworks focus on micro-level technological innovation or macro-level competitiveness, but rarely on meso-level coordination between firms and institutions that allows four circuits to function jointly: policy and regulatory architecture (permits, standards, grid access, procurement); technological value-chain alignment (complementary inputs like critical minerals, recycling systems); organisational transformation (firm evolution from startups into manufacturers); and financial metabolism (managing capex cycles and working-capital delays through structured debt and equity). Battery regulations exemplify temporal misalignment. The EU's battery passport and safety restrictions on reuse obstruct second-life storage industries, despite technological feasibility, because regulations evolve on political timescales incompatible with firms' financial and production cycles.[2]

Even in a ranking dominated by the USA and China, EU countries continue to host some of the world's most sophisticated applied research infrastructures. Fraunhofer-Gesellschaft remains the world's second-largest public research patenting organisation after Shenzhen Institute of Advanced Technology. France places two major public research institutions in the global top tier: Commissariat à l'Énergie Atomique et aux Énergies Alternatives and INSERM.. ETH Zurich continues to perform at globally elite levels despite Switzerland's small size. Between 2000 and 2020, academic patents in Europe rose from roughly 6% of all European Patent Office filings to more than 10%. European universities – such as Grenoble Alpes University, the Technical University of Munich, Lund University, the University of Oxford and the University of Cambridge – are filing patents at remarkable scale. Grenoble Alpes University alone exceeded 3,300 filings over that period. In international comparisons (measured by international patent filings (PCT), European countries have as many patents as the USA but fewer than China. The continent is not, by any reasonable measure, running short of scientific output.

Consider the case of Germany, which occupies a pivotal role as the industrial "powertrain" of Europe, producing some of the most sophisticated and competitive assets in sectors critical to the energy transition, manufacturing and infrastructure. Public discourse continues to frame Germany through the lens of digital lag, overlooking the fact that its innovation ecosystem is highly international, collaborative and increasingly oriented toward global markets. Industrial startups emerging from Germany are not inward-looking Mittelstand firms, but globally competitive ventures operating in complex, capital-intensive sectors such as advanced manufacturing, energy systems and climate technology even in the face of intense competition from China and the USA. Yet this strength is poorly reflected in capital allocation. Only around 10-15% of European private equity (PE) investment flows into Germany, compared to 20-25% into the UK, where capital is disproportionately directed toward software, fintech and other low-capex sectors.[3]

The problem, therefore, is not a lack of technical innovation. Patent data[4] suggests that many European countries are world leaders on advanced patents in manufacturing. When adjusted for size and sectoral specialisation, several European economies generate very high patent intensity, particularly in advanced engineering and industrial technologies. Indeed, Germany, the Nordics and the Netherlands generate dense patent output relative to population and economic size. The USA shows a stronger concentration in digital and software-related innovation, while China combines massive scale with rapid technological catch-up across sectors. As Garcia-Herrero et al. (2025) showed, the EU also does better than expected in some critical technologies, accounting for roughly 28% of the most radical breakthroughs in quantum photonics across China, the USA and Europe combined, a share that quietly puts it ahead of China in that niche. Then there are semiconductors, where the headline numbers can be misleading. Europe's 15% share in

lithography looks modest until you notice that ASML effectively controls the most advanced machines in the world.

The result is a differentiated landscape in which Europe remains strong in engineering-intensive domains, even as it lags behind in the fastest-growing digital fields. The problem is a severe lack of appropriate financing structures with a more directive ("developmentalist") component. Industrial technology requires long-term capital, operational expertise and coordinated ecosystem support, conditions that traditional VC models are ill-suited to provide. Germany's strength lies in its dense network of research institutions, engineering capabilities, and industrial clusters, supported by actors such as Fraunhofer, KfW and HTGF. However, without a much bigger reallocation of capital toward industrial scale-up, Europe risks underutilising this foundation.

This reflects an enduring fallacy: once innovation achieves commercial validation, competition and investment will autonomously generate industrial ecosystems. This logic, borrowed from software and biotech, fails for capital-intensive manufacturing. The consequence is high post-validation corporate mortality and chronic under-industrialisation despite technological excellence, eroding Europe's industrial competitiveness at alarming rates. Germany alone saw over 120,000 industrial jobs lost in 2025, continuing into 2026, with major cuts in the automotive and chemical sectors.[5] The EU lost almost a million manufacturing jobs between 2019 and 2023.[6] Manufacturing, one of Europe's critical sources of quality employment,[7] saw a threefold increase in jobs lost to company restructuring in the first five months of 2025 compared to 2022. As the next section shows, to date, the EU has addressed the problem of underfunded innovation and the market failure that accompanies it by mobilising its government venture capital (GVC) funds. Success has been mixed.

1.5 State of the art: Non-bank financing for commercialising innovation

Academic research on state-owned financial institutions has focused on development or promotional banks, only recently examining GVC (Musacchio and Lazzarini 2014; Mertens et al. 2021; Bruszt et al. 2022). Economists find that government-backed venture funds can complement private investors by filling gaps from illiquidity, excessive risk or information problems with European programmes demonstrating this effect (see Xi and Ban 2026 for a summary of the literature). Some argue that government venture funds are essential for ambitious innovation by creating knowledge platforms private sectors later commercialise (Janeway 2012).

Economists have disputed the usefulness of these forms of state investment vehicles, but during the past few years, the literature converged on a nuanced conclusion: GVC is neither inherently harmful nor reliably effective, and its impact depends heavily on design and implementation (see Testa et al. 2024 for an overview). Early concerns that GVC crowds out private VC have largely softened, with more recent evidence suggesting it can have an additive effect on broader VC ecosystems. However, at the firm level, GVC alone tends to deliver weak results, especially when it operates without private co-investors, showing limited impact on growth, innovation, efficiency or exit success. Underperformance is often linked to political pressures, bureaucratic constraints and non-commercial objectives shaping investment decisions. The key takeaway is that heterogeneity matters: well-designed schemes, particularly those that crowd in private capital and minimise political interference, can work, while poorly structured ones tend to underperform.

Whilst GVC has been studied in Europe (Moretti 2025), broader Asia (Klinger-Vidra 2018) and China (Naughton 2021: Beck and Larsen 2025) cross-regional comparisons remain rare (Li and Ban 2026). Research on industrial policy financing concentrates on central bank interventions (Larsen 2022; Kedward et al. 2024), subsidies (Juhász et al. 2024) or state bank lending (Thurbon 2016; Ban 2013),

with insufficient attention paid to how government finance backs technological innovation (Chang and Andreoni 2020; Aiginger and Rodrik 2020).

China's GGFs have been studied for their critical role in financing China's advance to overtake Western competitors (Luong et al. 2021; Wei et al. 2023). Unlike European government funds, China's GGFs maintain state control over innovation finance, prioritise technological breakthroughs over profits and coordinate primarily with state-owned entities (Luong et al. 2021; Wei et al. 2023; Li and Ban 2026). This operates less as top-down command and more as adaptive coordination across central, provincial and municipal authorities directing whole value-chain development (Naughton 2021; Gomes and ten Brink 2023). However, to date, they have not been studied for the lessons they provide for China's industrial competitors.

Europe takes a more constrained approach. EU and member-state funds anchor European risk capital, and "entrepreneurial ecosystem growth occurred as government interventionism increased, rather than retrenched", particularly in Germany and France (Moretti 2025: 19). But apart from some sectoral focus in EU and French funds, the European ecosystem concentrates on fostering general innovation capabilities rather than targeting specific technologies (Moretti 2025). EU state aid rules require market-conforming behaviour and limit direct public investment whilst requiring alignment with private incentives. European GVC operates between a "market-creator state" and a more interventionist model (Mocanu and Thiemann 2024; Moretti 2025; DiCarlo and Schmitz 2025), producing far smaller cleantech risk capital mobilisation than China's state-directed approach.

2. THE BEIJING SCALE-UP RULEBOOK

2.1 How the Chinese dirigiste developmental state works

For many Europeans, it is politically soothing to reduce China's performance on scaling in high-value-added sectors to an expression of either Chinese authoritarianism or, in a culturally essentialist vein, Chinese entrepreneurial culture. But what is politically soothing may not be analytically refined. Take China's authoritarian hierarchies and centralist advantages. The reality is more complex. It is easy to read this through the lens of top-down control, with directives cascading from the Communist Party of China through the economy. This interpretation captures the clarity of strategic direction and the disciplining politico-administrative mechanisms that accompany it, but it misses how policy is made and implemented. What emerges in practice is closer to a system where policymaking evolves through feedback, negotiation and local adaptation. Provincial and municipal governments do not simply execute orders from Beijing. They interpret them, adapt them to local conditions and compete with one another to demonstrate results. This competitive decentralisation has been a defining feature of China's political economy since the reform era (Gomes and ten Brink 2023)

Indeed, China's central government sets broad priorities through five-year plans, but implementation is delegated to provincial and local governments, which are encouraged to experiment with different approaches (Heilmann and Perry 2011; Naughton 2021). Some strategies fail, others scale and the system adjusts accordingly. It is a model built around parallel experimentation with real capital and real firms, where variation across regions is not a bug but a feature. The presence of hierarchy is clear, in the sense that direction is defined at the top, but what follows is structured experimentation, with incentives that reward local actors for discovering workable solutions.

The system has ample downsides, especially the well-documented waste of highly visible but low value-added projects (Leng 2025), but China's capacity to innovate and turn innovation into business hyperscalers is undeniable. Ask any European company meeting Chinese competition at home and abroad. According to the Australian Strategic Policy Institute's Critical Technology Tracker, which evaluates 64 critical technology categories across eight domains, including artificial intelligence (AI) and robotics, China leads in 57 of these categories while the USA leads in only seven. Scaling came in tow. By 2025, China had produced over 330 unicorn companies and attracted the second-largest amount of startup funding globally, trailing only the USA (PitchBook Unicorn Companies Tracker 2025). The country has climbed the World Intellectual Property Organization's Global Innovation Index, entering the global top ten for the first time in 2025 (ranking tenth among 139 economies), driven by exceptional performance in high-tech exports and patent generation.

The result is a system that is simultaneously centralised and fragmented. Authority is concentrated at the top, but implementation is dispersed across actors who bargain, coordinate and sometimes compete. Some scholars emphasise this fragmentation, others the system's flexibility, pointing to the way central authorities set long-term goals while allowing lower levels significant autonomy in implementation (Taylor and Garlick 2025). This combination allows China to maintain coherence at the strategic level while generating diversity at the operational level, which in turn feeds into rapid cycles of learning and scaling.

Taking this structure seriously changes how the comparison with Europe should be framed. The Chinese case is neither a model to be replicated wholesale nor an outlier to be dismissed as institutionally incommensurable. For this author,

its value lies in making a set of mechanisms, coordination, experimentation and scaling that are not inherently tied to authoritarian rule visible, even if they are particularly visible in that context. The relevant question for Europe is not whether it can become China. It is whether it can build functionally equivalent mechanisms within its own political and institutional constraints.

This is where the contrast with the EU becomes sharper. EU institutions operate through a networked system of coordination that prioritises negotiation, legal consistency and political balance (Di Carlo and Schmitz 2023; Di Carlo et al. 2026). This produces legitimacy and stability, but it also slows down adaptation to challenging tasks like scaling in new sectors. Policy change requires alignment across member states, compliance with state aid rules and careful management of distributional conflicts. The system is designed to prevent unilateral action and ensure fairness, which makes it robust in some respects but less capable of rapid, coordinated experimentation across regions.

The gap that emerges is therefore institutional and temporal. China has built mechanisms that allow it to experiment, adjust and scale across regions within a guided but flexible framework. Europe has built mechanisms that ensure agreement before action. One system discovers what works through iteration. The other seeks to define what should work in advance. From the perspective of Europe's industrial future, this distinction matters. European firms increasingly compete with Chinese firms that benefit from systems capable of accelerating innovation and scaling it rapidly. The disadvantage is not only about costs. It is about the speed and coordination with which innovation is turned into industrial capacity.

2.2 GGFs: Born from industrial ambition

GGFs combine public policy objectives with market-based investment practices. The state defines broad strategic priorities while professional fund managers allocate capital by commercial criteria. This hybrid structure allowed GGFs to operate where purely private VC was reluctant to engage. The Chinese state experimented with these institutions in the 1990s, but they remained small until the 2010s, when China made a strategic shift toward high-tech industries in response to the American pivot to the Pacific region. GGFs peaked in number in 2016, reaching 1,849 funds by 2021 (Wei et al. 2023: 944). In the beginning, local governments used GGFs to bring private money into public infrastructure projects through public-private partnerships (PPPs). A PPP was when government and private companies jointly financed and built infrastructure like roads, ports or water systems. Over time, the focus changed. As innovation became a bigger government priority, especially after the 2015 policy push to support entrepreneurship and new technologies, GGFs started putting more money into strategic sectors like advanced manufacturing and new materials. By 2022, more than 70% of new GGFs were aimed at these emerging industries, according to Zero2IPO, a major investment tracking database.

GGFs operate through several different structures. Some invested directly in innovation ventures. Others acted as limited partners, which meant they contributed capital to professional investment institutions like PE or VC firms, which then made the actual investment decisions. Still others functioned as funds of funds (FoFs), providing capital to sub-funds commonly set up at the provincial or city levels. These sub-funds then steered investment into strategic sectors, as identified by the government's Five-Year Plan priorities (Pan et al. 2024: 12). Although GGFs were formally structured as FoFs and operated as limited partners, their influence was stronger than that of typical market investors. A limited partner normally contributed money and received returns but did not direct strategy. GGFs were different. Their core purpose was to steer investment toward government priorities rather than simply seek financial returns. As Li and I showed

elsewhere (Li and Ban 2026), GGFs were often part of regional innovation platforms with a strong academic component. Universities worked closely with GGFs through academic funds that channelled capital into early-stage technologies, supported company creation and connected innovation to industrial demand.

By August 2024, GGFs had a target value of $1.8 trillion (13 trillion renminbi) spread across 2,126 funds. These numbers required caution, however. In 2021, only 26% of existing GGFs had completed fundraising and reached their target size. Many sub-funds remained inactive due to a lack of quality partners to invest alongside the government (Wei et al. 2023: 948). The confirmed contributions deployed in 2022 were 6.61 trillion renminbi, roughly half the target of 12.84 trillion renminbi (Pan et al. 2024: 13). A conservative estimate suggested China had backed its industrial innovation ambitions for this hypertransformation phase with around €600 billion (Li and Ban 2026). To put this in context, this roughly equalled the total assets of the EIB, Europe's main development financing institution.

After 2010, GGFs began investing more in companies that were already listed on stock markets. Listed firms were companies with shares traded publicly on exchanges. In theory, GGFs were meant to support small, early-stage companies that struggled to find funding from private investors. Early-stage companies were startups still developing their first products. In practice, GGFs often acted as scale-up investors. They provided capital to companies that needed to hyperscale and required tens to hundreds of millions of dollars to rapidly expand production and market share (Xi and Ban 2026).

2.3 GGFs and the planning mechanism

As the graph below suggests, in the Chinese planning system, central priorities are articulated in Five-Year-Plan-shaped sectoral mandates and provincial and municipal actors translate these priorities into investment vehicles adapted to local ecosystems (Ban and Hasselbalch 2025). To this end, these funds draw capital predominantly from government fiscal sources, SOEs and state financial institutions. Fiscal departments and state asset supervisory bodies participate as observers or approvers or hold seats on committees. Private VC firms participate but do not define strategic direction. As late as 2025, public VC remained dominant. In contrast, according to Chen (2023),[8] in China, the largest limited partners in private VC funds are wealthy families and individuals, accounting for roughly 60% of capital commitments. The second-largest group is unspecified institutional investors labelled "VC/PE investment institutions", contributing about 20%. The third group is enterprises (state-owned or privately owned businesses) making direct commitments to venture funds, accounting for roughly 10%. For about 11% of funds with enterprise limited partners, the enterprise is the sole limited partner, functioning essentially as a corporate VC.

Transitioning to scale is where the Chinese system historically shows comparative strengths relative to Europe. Once firms become recognised as important, large state-linked financial institutions enter the picture. Policy banks like the China Development Bank (CDB) play a decisive role. CDB extended enormous long-term credit lines to sectors prioritised by industrial policy: solar photovoltaics; batteries; telecommunications equipment; rail infrastructure; and electric vehicles. These loans allowed firms to build factories, scale production, invest in upstream integration and survive prolonged periods of overcapacity or low margins. Financing was structured around industrial objectives rather than quarterly earnings. Large state-owned commercial banks also became important during this stage. Unlike Western commercial banks operating primarily under shareholder-return logic, Chinese state-owned banks operated within broader political and developmental frameworks coordinated through Five-Year Plans and industrial strategies. Lending toward strategically important sectors carried implicit political backing and often lower perceived regulatory risk. The People's Bank of China reinforced these priorities through targeted relending facilities, preferential liquidity programmes and regulatory guidance encouraging credit flows toward strategic sectors.

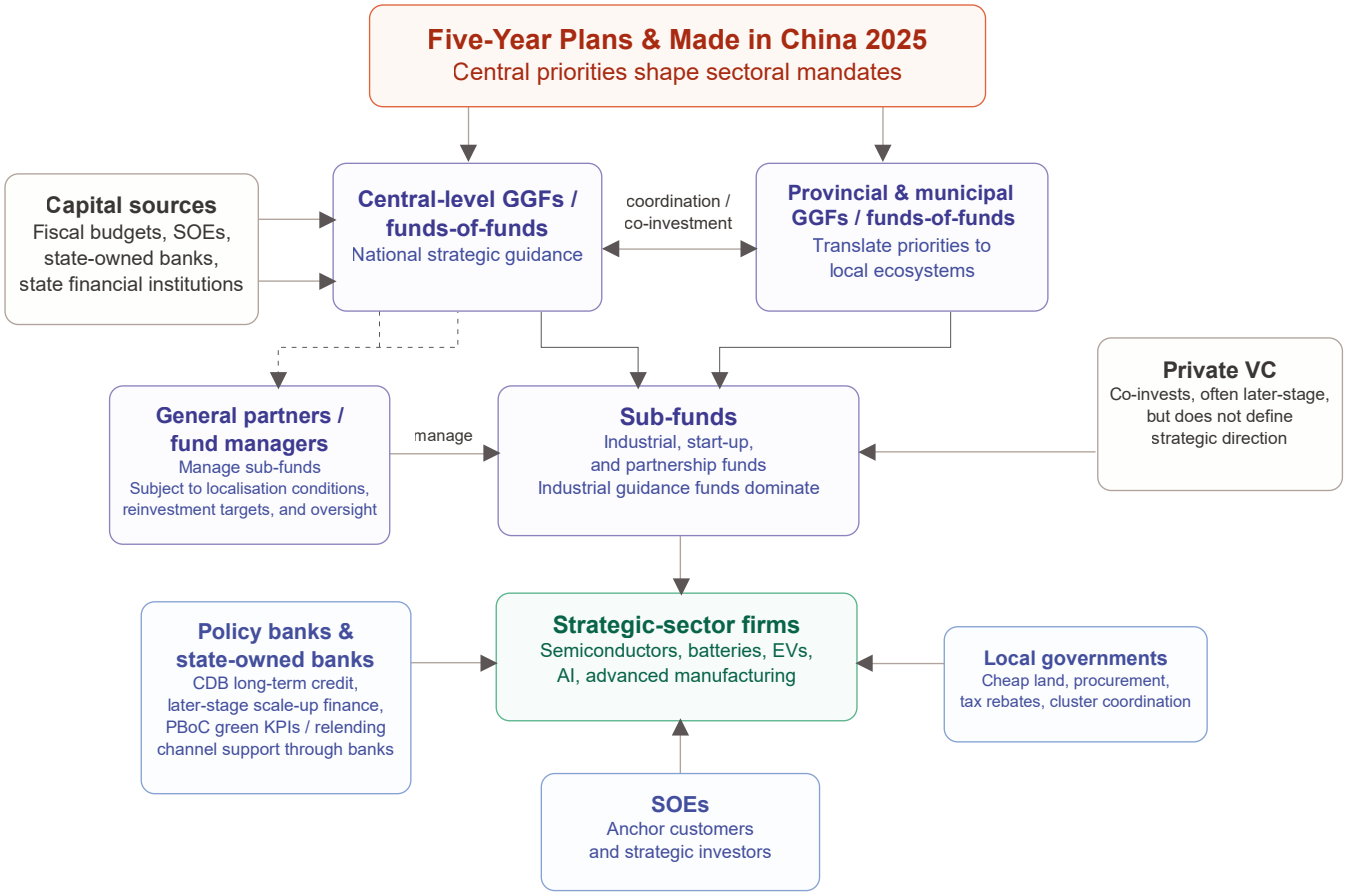

Figure 1. Five-Year plans & Made in China 2025

Local governments continued intervening aggressively during scale-up. Municipal authorities provided land for factories at below-market prices alongside infrastructure buildout, procurement contracts and tax rebates. They supported local supply-chain ecosystems. SOEs became anchor customers or strategic investors. In sectors like batteries and electric vehicles, local governments coordinated entire industrial clusters rather than supporting isolated firms. Scaling occurred collectively across ecosystems of suppliers, logistics operators, component manufacturers, universities and financiers. Local governments also intervened through GGFs.

In the Chinese innovation journey, GGFs display a bias toward late-stage financing to the point that policymakers used early-stage financing targets to constrain the trend. GGFs raised larger amounts of capital, invested in more projects and were more active in later rounds than private VCs. GGFs came in three types: startup funds; industrial funds; and partnership funds. Industrial guidance funds predominated. Given their background in the state, these focused on industrial upgrading and development rather than supporting startups, which explained why early-stage investment remained limited despite policy intentions.

Overall, then, depending on context, GGFs function as patient, risk-taking investors supporting early-stage innovation and as financially disciplined vehicles generating returns for local government balance sheets. GGF managers face bureaucratic evaluation systems rewarding visible achievements during specific administrative tenures, creating pressure toward measurable short-term progress rather than uncertain long-duration experimentation. The absence of fault tolerance mechanisms means investment failures can trigger political

consequences, audits and even damage the careers of fund managers. Under these conditions, rational behaviour tilts heavily toward later-stage, lower-risk investments in established companies with proven technologies. GGFs, then, can effectively support scaling where technological uncertainty is lower and industrial outcomes are visible. They struggle to replace the risk capital and technical expertise that international venture investors once provided during early commercialisation phases where failure rates were high and timelines extended beyond bureaucratic evaluation cycles. China's struggle is not scaling capital, as in Europe, but early-stage capital.

What Beijing increasingly seeks is an integrated financial chain capable of accompanying firms continuously through all four stages, from technology readiness to global leadership, without relying on the transnational VC networks that once connected Chinese firms to the US-centred innovation system. Whether that's achievable is an open question, but the ambition is clear: build a complete domestic financing ecosystem that can support hard tech from conception to the global scale without needing American capital, expertise or exit markets.

2.4 Forging an innovation juggernaut: GGFs

While both China and the EU produced strong research and large numbers of patents during the past decade, China was far more effective at embedding financing and scaling mechanisms directly into the innovation process. Each stage of the value chain had institutions tailored to its risk profile and time horizon (Li and Ban 2026). In Europe, most capital was either too generic or too light-touch. Understanding catalyst capital as a missing institutional layer clarifies why Europe's massive savings did not translate into commensurate industrial outcomes.

Xi and Ban (2026) shows that GGFs combine public policy objectives with market-based investment practices. The state defines broad strategic priorities like advancing AI while professional fund managers allocated capital by commercial criteria. This hybrid structure allowed GGFs to operate where purely private finance was reluctant to engage. The problem they addressed was that frontier technologies required large upfront investments alongside long development timelines. They also tolerated high failure rates, all of which sat uneasily with conventional finance's short-termism and risk aversion.

The state remains in control through layered coordination. Funds draw capital predominantly from government sources, SOEs and state financial institutions. Fiscal departments and state asset supervisory bodies participate as observers or approvers or hold seats on committees. Private VC firms participate but do not define strategic direction. As late as 2025, public VC remained dominant.

In December 2025, China launched a new equity-based superfund ($14.5 billion, leveraging $140 billion) specifically designed to address the late-stage-ism inherent in many existing GGFs. The fund, which was expected to facilitate the establishment of more than 600 sub-funds, was jointly initiated by the National Development and Reform Commission (NDRC) and the Ministry of Finance (MOF), with three regional funds set up in the Beijing-Tianjin-Hebei region, the Yangtze River Delta region and the Guangdong-Hong Kong-Macao Greater Bay Area.[9] The fund is designed to leverage central government capital to attract broad participation from local governments, central SOEs, financial institutions and private investors, with a focus on supporting original and potentially disruptive technological breakthroughs in frontier fields. By mandate, the fund targets only 30% late-stage funding. Most importantly, the new superfund was created to replicate the time horizons that US VC once offered to Chinese tech firms. The new superfund's 20-year lifespan and ten-year exit phase is meant to counteract those short-term pressures, allowing it to fund more ambitious research and development projects. In part, this policy move acknowledges the severed access to American VC, which once provided the patient capital needed for tech innovation.[10]

This architecture allows large volumes of capital to be mobilised and deployed into designated

sectors such as semiconductors, AI, advanced manufacturing, batteries and renewable energy. Per capita public venture finance in China far exceeds that of the EU. Central funds above $1 billion collectively manage hundreds of billions in assets, exceeding comparable private VC pools. The system links early-stage funding, scale-up finance and even rescue operations under a unified strategic logic (Li and Ban 2026).

2.5 GGFs as commercialisers of technical university innovation

China's National Intellectual Property Administration reported that the industrialisation rate of university invention patents reached 10.1%. This figure sounds reassuring until context arrives. In 2022, Germany's figure was 3.9%. China roughly tripled its patent commercialisation rate in three years by building institutions designed specifically to commercialise innovation and then measure them relentlessly.[11]

The latest official figures, based on the 2025 China Patent Survey, for the industrialisation rate of enterprise invention patents reached 54.0% in 2025, up from 53.3% in 2024 and 51.3% in 2023. The industrialisation rates of invention patents for large, medium and small enterprises were 51.2%, 62.0% and 57.9%, respectively. For universities and research institutes, the rates were much lower but rising fast. By the end of 2025, the industrialisation rate of invention patents was 10.1% for universities and 17.2% for research institutes. This was a big increase from 2022, when the corresponding figures were only 3.9% for universities and 13.3% for research units. Between 2001 and 2021, Chinese universities transferred 65,055 invention patents to enterprises, growing at nearly 40% annually (Ye et al. 2024). None of this reflects magic or a lack of competitive elections in China. It reflects a deliberate institutional decision to treat commercialisation as the point of science rather than as an afterthought to research.

The strength of Chinese academic funds lies in network embeddedness linking universities, firms and regional governments, allowing capital to flow quickly into strategic sectors and ensuring innovations are absorbed into production. Unlike European models (Harmaakorpi 2006), China blended two functions: (1) smart regional specialisation via transplantation of non-local expertise, particularly in regions with limited endogenous innovation capacity; and (2) provision of risk capital in tandem with GGFs. As Conle et al. (2023) showed, Guangdong's innovation platforms combined top-down planning with selective bottom-up participation, actively recruiting non-local universities, research institutes and firms to contribute to industrial upgrading. Zhejiang University subsequently established the Alumni Future Innovation Mother Fund in 2016, reaching $1.7 billion in assets by 2024.[12]

The total contract value for technology transformations by academic quasi-VC firms rose from $15 billion in 2019 to $29 billion in 2023, while transformational projects grew from 433,000 to 640,000. Technology transformations meant converting research discoveries into commercially viable products that companies could manufacture and sell. This doubling of activity in just four years showed how rapidly China's academic-industrial innovation ecosystem had expanded during the period when GGFs became central to development strategy.[13]

Consider the Foshan GDUT Institute, established in 2013 by regional planners under Guangdong's 2011 Plan, it leverages Guangdong University of Technology's engineering capabilities to provide subsidised innovation services for regional firms, to incubate technology firms in government-prioritised sectors, to conduct R&D for key enabling technologies and to develop regional skills (Conle et al. 2023: 707). Operating entrepreneurially, the institute generates revenue from local industry engagement – notably developing automated demonstration lines for upgrading traditional manufacturing sold at government-subsidised prices. Crucially, it incubates solutions internally whilst functioning as a VC entity. GDUT funds, incubates and takes equity stakes in startups by utilising its R&D outputs through a dedicated investment fund supported by government grants or local venture funds. These institutes function as government quasi-VC firms, complementing direct investment-oriented GGFs

in the state-led execution of planned technological missions.

In other cases, however, university funds have been reported to establish such funds with industrial capital or by direct VC investment. For example, Zijingang Capital, a VC and PE firm with deep connections to Zhejiang University, directly invested 40% of its fund in Zhejiang University related startups, including faculty-founded and alumni-led companies. Indeed, many of its investors (limited partners) are also successful Zhejiang University faculty, alumni and research spin-offs.[14] This VC investment space became so attractive for Chinese academia that even private universities joined in the VC spree.[15]

Indeed, China's university-backed quasi-VC funds dwarf their European counterparts in scale and strategic value-chain integration. Whilst the Technical University of Denmark (DTU) manages PreSeed Ventures (PSV Hafnium, nearly €1 billion), Belgium's Gemma Frisius Fund (€26 million) and Germany's Fraunhofer Ventures (€31.5 million) remain modest, Chinese university funds routinely exceed $1 billion – Zhejiang University's Alumni Future Innovation Mother Fund reached $1.7 billion by 2024, whilst Tsinghua manages over 100 billion renminbi in deep-tech ventures. Chinese university quasi-VC funds operate as public entrepreneurs linking sectoral VC networks with GGFs through collaborative structures lacking in Europe.

2.6 GGFs as localisers of government equity investment

In practice, GGFs were used to impose localising conditions on the general partners they invested in. For example, general partners were required to allocate a minimum share of capital to particular regions or industries. This was defined through a "reinvestment ratio", usually set between 1.1 and 1.5. In addition, GGFs monitored fund managers to ensure that investments aligned with policy priorities and, in some cases, required a seat on the investment committee. At the same time, this indirect approach did not give governments full control over local economic development. Structural constraints built into PE models limited their role. In particular, the parent fund's equity stake in sub-funds was capped at 50%, and in practice GGFs typically invested less than 30% (Li and Ban 2026). The constraints were relaxed in 2025.

The structure of the sub-funds has a sectoral and localist orientation. As noted by Luong et al. (2021: 151-152):

> *These local funds are often integrated with industrial parks and possess a nuanced understanding of local dynamics, fostering a network of funds-of-funds. This structure allows fund managers to follow the given investment priorities while outsourcing market-oriented investment decisions to firms at the local level, which then select specific projects for funding. […] Facilitated by banks and financial institutions, this model enables a dynamic capital flow across the sector. Importantly, this system encourages ongoing networking between company executives, senior researchers, and policymakers, ensuring that policy directions are informed by industry insights and progressively contribute to sectoral advancement.*

The most active local GGFs are in Beijing and industrial hubs in coastal cities where pre-existing high-tech agglomerations enable the sub-funds to invest in "deep tech" startups (Wei et al. 2023). Localised investments by GGFs help mitigate the risk of harmful competition between provinces and cities, avoiding a costly race to the bottom to attract innovative firms through tax waivers. Most importantly, it enables local governments to build both financial resources and technical capacities for how to design a better innovation policy without resorting to fiscal transfers or soft public bank loans, a particularly sensitive issue given high levels of provincial state indebtedness (Li and Ban 2026).

2.7 GGFs as coordination devices for industrial upgrading and leapfrogging

Nearly 60% of China's largest GGF is owned by central-level state actors. The MOF holds stakes alongside government-owned financial institutions like CDB Finance, which is fully owned by CDB. Insurance companies like the People's Insurance Company of China and China Pacific Life Insurance Corporation are shareholders. Even the China Tobacco Corporation participates, converting its profits into risk capital through GGF ownership. This reveals something fundamental about how China's system works: companies that make money in traditional industries become sources of investment capital for future technologies. The remaining 40% of ownership comes from provincial and city governments, VC firms and other SOEs, with private capital having marginal equity stakes (Wei et al. 2023). What emerges is a form of co-investment that spans China's entire state apparatus, from Beijing ministries down to municipal authorities.

This structure exists for a reason. The central government explicitly aligns GGF operations with "Made in China 2025" (MIC25) and Five-Year Plans, which set the government's medium-term economic road map. Some large funds drifted away from this mission, focusing instead on simple upgrading activities for SOEs or serving as social cohesion funds disconnected from venture investment. Many of these closed in 2025 when the central government decided they were no longer serving the strategy. Most GGFs instead concentrate on what the government calls "emerging productive forces". Semiconductors, advanced manufacturing, information technology and robotics; these are the sectors where China believes it can win. The logic underlying this selection comes from elsewhere in Asia's development story: catch up with established rivals, learn from them and eventually outcompete them by developing newer technologies domestically at scale. When successful, this is called leapfrogging, meaning companies skip over older technology generations entirely and jump straight to the newest ones. The automotive sector exemplifies this. GGFs backed innovation across the entire electric vehicle value chain, allowing Chinese firms to leapfrog both Western producers and other Asian manufacturers that had dominated conventional car manufacturing for decades (Ban and Scepanovic 2026).

The governance structure of the largest funds directly connects to China's planning system. The Ministry of Industry and Information Technology and the NDRC oversee sector-specific leadership groups. These bodies set the strategic goals of the funds and specify which sectors and activities each one specialises in. Legally, this strategic direction should not dictate day-to-day investment decisions. The central government does not micromanage which individual companies receive funding. Instead, it sets the broad technological vectors the funds pursue (Luong et al. 2021). In practice, however, the state exercises deeper control in some cases. Beck documents how "the three central-level capital operation companies (SDIC, Guoxin and Chengtong) manage over 22 GGFs worth RMB1.8 trillion in combined value" (Beck 2025: 156).

The ownership structure reveals a second layer of decentralisation that previous research has missed. Central, provincial and city government entities all participate as shareholders, creating a genuinely multi-level developmental finance system. City-level GGFs represent over half the total GGF count and account for 42% of their realised capital (Li and Ban 2026). This municipal dimension contradicts conventional political economy studies on GGFs (Kennedy 2024; Beck and Larsen 2024), which have focused on central planning without recognising how much innovation financing happens at the local level. Provincial-level GGFs rank second, with 38% of realised scale. What ties these levels together is a pattern of central-local partnership. Central-level GGFs and capital operation companies frequently participate as limited partners in local GGFs. For example, central-level Chengtong invests in the Zhejiang State Enterprise Reform and Development Fund, which supports high-tech innovation and SOE reforms in Zhejiang (Beck 2025: 157). This central-local duality captures the essential balance in China's GGF strategy: local authorities drive the specifics of innovation planning tailored to their regions, mobilising GGFs to this end alongside other local funds, while central state leadership and

its financial entities (including central GGFs) provide core capital and set the overall direction.

What about private VC? The three largest GGFs far exceed the three largest private VC firms in terms of total assets. Consider only the $484 billion in centrally owned GGFs, which exceed $1 billion per fund (Table 1). Aggregate private VC above this same threshold amounts to just $122 billion, one quarter of the GGF scale (Wei et al. 2023). The state's hand in investment decisions is explicit and widespread. Surveys show that 31% of GGFs have government fiscal departments or state asset supervisory bodies as observers on investment committees. Another 29% involve these bodies as final approvers of investment decisions. 25% include them directly in investment committees that decide which companies receive funding (Wei et al. 2023: 953).

GGFs do indeed conform to investing in sectors where China has been known for its technical innovation boom in the past few years. China's growing reliance on FoFs reflects the need to align with the planner's signals increasingly emphasising investment in early- and seed-stage tech projects (CVsource 2023). This raises their relevance for the clean tech value chain. By Naughton's estimates (2021: 108), during the 2010s 38% of the total GGF volume was allocated to multi-sectoral investments; 14% to infrastructure, energy and climate; and 11% to advanced manufacturing.

2.8 Quantitative evidence of GGF effectiveness

Beyond anecdotal evidence, the quantitative literature in economics and economic geography has addressed scepticism about Chinese GGF effectiveness. GGFs are less financially agile than private VC firms and have lower rates of successful company exits through initial public offerings (IPOs, where firms go public on stock markets) or acquisitions by larger companies (Peng et al. 2024; Kajitani et al. 2024). Crowding-out concerns persist. This means that GGF capital sometimes prevents private investors from entering the market, with GGFs struggling to attract private capital (Da Rin et al. 2006). Yet Huang et al. (2023) find that GGF-backed firms achieve higher IPO returns because government backing signals credibility to investors, although this advantage does not sustain operational performance (they don't run better once they're public).

The critical question is whether public capital mobilised additional private investment and generated real innovation output. Suchard, Humphery-Jenner and Cao (2021) analysed 4,700 Chinese firms and found that partially government-owned vehicles increased exit success rates and reached firms at earlier stages than their private counterparts. The time to exit improved from 8.9 years under private VC to 7.2 years under hybrid vehicles (funds with both government and private money). The mechanism is hybrid governance with genuine private co-investment. Wholly government-owned vehicles generated no such benefit.

Yet emphasising GGF underperformance on traditional financial metrics misses their actual purpose: directing capital toward innovation-driven growth priorities set by government strategy (Naughton 2021). Econometric studies show that GGFs prioritise policy-endorsed sectors (industries the government wants to develop), invest at earlier stages and hold equity longer than private VC while supporting innovation in less developed regions (Ge et al. 2024). Importantly, when private VC firms retreat from policy-backed industries facing high uncertainty, GGFs continue investing (Ge et al. 2024).

GGFs back innovation more aggressively. Patent applications of GGF-backed companies in nationally and provincially encouraged industries are 20.3% and 15.3% higher, respectively, than in untargeted industries, compared to 4.7-4.8% for private VC-backed companies (Ge et al. 2024). By 2021, over half of GGF investments were concentrated in telecommunications, computers and pharmaceuticals, which are three sectors where Chinese firms now compete with global leaders (Wei et al. 2023). Rao et al. (2026) found that GGFs strengthened firm-state ties and improved access to environmental subsidies, promoting green innovation indirectly. However, GGF-backed firms do not attract more private capital afterward, limiting broader market impact and repeating a familiar weakness of traditional industrial policy.

Table 1. Central GGFs over $10 billion and private financing.

Central GGF	Size (billion $)	Sectoral focus	Private VC	Size (billion $)
National Integrated Circuit Industry Investment Fund[16]	96	Semiconductors	Sequoia Capital China	55
China Structural Reform Fund	63	Large SOEs transitioning to high-value-added activities in telecom, energy and pharma	Legend Capital	48
China Railway Development Fund	54	Advanced railway equipment and infrastructure	Qiming Venture Partners	10
China Venture Capital Fund	28	AI, big data, cloud computing and Internet of Things	Matrix Partners China	10
Central Guiding Demonstration PPP Fund	25	Public utilities and environmental projects, healthcare and elderly care	Sinovation Ventures	7
China Innovation Fund	21	AI, quantum computing, blockchain, 5G and 6G communications, and cybersecurity	Shunwei Capital	7
NMITUF	21	Manufacturing upgrading	K2VC	1
Guoxin Central Enterprise Operation Investment Fund	21	Strengthening SOEs in high-end equipment manufacturing, aerospace, shipbuilding and automotive industries	ZhenFund	1
China Internet Investment Fund	14	Digital economy and e-commerce		
Central Enterprise Rural Industry Investment Fund	14	Agritech		
China National Green Development Fund	13	Solar, wind and hydropower; energy storage solutions; EVs		

Source: Li and Ban (2026).

GGFs distribute capital across inland areas that private investors avoid (Beraja et al. 2024). While GGF-backed firms underperform in IPOs and acquisitions compared to private VC-backed firms, they foster innovation scaling in high-tech zones with measurable productivity gains. This means companies produce more output from the same inputs (Wei et al. 2023). Some GGFs support talent attraction, infrastructure development and technology transfer beyond pure investment activities (Standaert and Manigart 2018). GGF equity allocations correlate with 5.5% surges in industrial activity and agglomeration benefits. Agglomeration means clusters of related companies that strengthen each other (Xiao et al. 2023). Challenges persist: lower-than-expected fundraising; limited exit diversification (Lau 2024); overcapacity exacerbating trade tensions (Xiao 2024); and inefficiencies from overlapping priorities (Wei et al. 2023). US restrictions on American PE and VC firms operating in China have escalated Chinese innovation costs and exposed GGF limitations in international brokerage capacity (Pan et al. 2024).

The link between GGFs and firm-level productivity was long assumed rather than clearly demonstrated. Xie and Lin (2025) clarify two mechanisms. GGFs

expand financing capacity, meaning companies can borrow or raise capital more easily. They also improve the allocation of innovation inputs, meaning companies spend R&D money more efficiently. Using data on renewable energy firms between 2008 and 2022, they show that GGF participation correlates consistently with higher total factor productivity (a measure of how efficiently firms combine capital, labour and technology). Effects are strongest among risk-averse firms (those hesitant to invest without guarantees), those in competitive industries where efficiency determines survival, and regions with distorted factor markets where access to capital and labour is uneven. In these contexts, GGFs play compensatory roles, easing constraints.

Consensus emerges that GGFs effectively support innovation ambitions as core components of China's distinctive state-led development model. On innovation output, Zhao and Zhang's (2025) analysis of 9,138 listed Chinese strategic enterprises (2010-2023) finds that guidance fund investment is positively associated with patent grants. Effects operate through two channels: alleviating financing constraints on R&D spending and improving access to tax incentives, which signal project quality to external financiers and reduce future borrowing costs. However, effects are statistically significant only in eastern regions with dense university and supply-chain infrastructure. They disappear in central and western regions lacking these complementary assets. Transplanting financial mechanisms without surrounding institutional ecosystems reproduces weaker outcomes. This is a critical lesson for Europe. Finally, Li and Beck (2025) added the systemic dimension. SOEs restructured as capital managers hold stakes in over 100 technology companies. State banks deploy capital through wealth management subsidiaries as limited partners in guidance funds. Local governments replaced land-backed financing vehicles with guidance funds as primary industrial development instruments. This represented, in their view, a comprehensive state-led financialisation rather than a mere form of adopting GVC with Chinese characteristics.

3. EUROPE'S PLAYBOOK ON SCALING UP INDUSTRIAL INNOVATION

3.1 Institutional distinctions

The EU mobilised **€377 billion** in funds that were potentially available to broader support scale-up (Tables 2 and 3) but in reality the dedicated instruments are much smaller. Specifically, the EU's dedicated scale-up financing architecture is composed of three main instruments: the European Innovation Council (EIC) Fund; the Scaleup Europe Fund (SEF); and the ETCI. These instruments differ in their investment model, governance structure and target segments, but together aim to address the persistent European growth-capital gap. Across these instruments, European scale-up financing can therefore be assessed according to three distinct levels. First, in terms of capital already committed, identifiable figures amount to slightly above €10 billion. Second, in terms of intended financing capacity, the combined target size of the instruments reaches approximately €28 billion. Third, in terms of broader capital mobilisation effects, these instruments aim to attract significant additional private investment.

Overall, however, these have been relatively small operations. China's National Integrated Circuit Fund and National Manufacturing Fund each deploy between €20 and €90 billion individually, embedded in a system where confirmed GGF contributions reached 6.6 trillion renminbi in 2022 alone, roughly €830 billion at current rates, representing half the system's target size. The EU's equity-based instruments amount to a few tens of billions at most. This gap determines whether an instrument can shape the cost curves and supplier ecosystems of entire industries or merely accompany a limited number of firms within them. In March 2026, ETCI announced a significant expansion in the second quarter of the year, whereby banks and institutional investors could pledge commitments targeted toward €15 billion over the lifetime of the initiative, with the aim of mobilising €80 billion in investments.[17] If successful, this could be a move to reduce the late-stage funding gap with China.

A broader assessment of Europe's scale-up financing capacity must also consider the wider financial architecture built around the EIB, the EIF and their mandates, including the European Fund for Strategic Investments (EFSI) and its successor, InvestEU. However, these programmes cannot be directly aggregated with dedicated scale-up instruments, as they pursue broader policy objectives and rely predominantly on indirect financing mechanisms. EFSI, which operated between 2015 and 2020, mobilised approximately €102 billion in EIB and EIF financing approvals, while its successor InvestEU had €84 billion in investments by the end of 2025. These investments were spread across infrastructure, SMEs, social investment, sustainability, innovation and other policy areas, rather than dedicated patient equity capital for scaling technology companies. The reported investment mobilisation associated with EFSI (approximately €540 billion) and InvestEU (€397 billion, so far) reflects the total value of supported projects, including additional private and public investments.

The EIF itself represents a significant European financial intermediation platform, with approximately €164 billion in assets under management at the end of 2025. Part of the funding is channelled through the above-mentioned programs: EFSI; InvestEU; and ETCI. A residual part is channelled through legacy programs such as COSME and InnovFin. The rest of the funding encompasses a wide range of instruments, including – on top of equity and VC – guarantees, securitisation and credit. The EIB also provides equity, quasi-equity and debt separately from the above-mentioned programs.

The distinction becomes even more important when considering the proposed ECF, which would introduce a gross financial envelope of approximately €234

billion for the period 2028-2034. However, this figure should not be interpreted as additional or dedicated scale-up capital. Rather than creating an entirely new funding stream, the ECF would largely consolidate and replace several existing EU programmes (e.g., Digital Europe, EU4Health, EDF and the European Space Program) within a single framework, with the objective of simplifying governance through a common rulebook and a single access portal. The fund would combine multiple financial instruments (including grants, loans, guarantees, procurement, equity and quasi-equity) and pursue a broad range of policy objectives organised around four major policy windows: (1) resilience, security, defence and space; (2) digital leadership; (3) clean transition and industrial decarbonisation; and (4) health, biotechnology, agriculture and the bioeconomy. While this architecture may improve coordination across previously fragmented programmes, it also implies that resources will be distributed across numerous technologies, sectors and policy objectives. Although the proposal foresees that at least €17 billion of ECF resources would be channelled through InvestEU, the proportion ultimately deployed as patient equity capital for scaling innovative firms remains unspecified.

Putting the two sides together, the scale-up gap between the EU and China is large under almost any framing: China's GGFs had subscribed roughly €790 billion by early 2025 (out of a €1.27 trillion target pool), against dedicated EU equity scale-up instruments, such as the EIC Fund, SEF and ETCI 1.0/2.0 combined, that barely reached €26-28 billion, meaning China's subscribed capital alone is in the order of **30 times the EU's dedicated pool**, and roughly 49 times if you compare target sizes instead. Even generously counting the EU's entire broader financial architecture (EFSI, InvestEU, EIF assets under management, plus the dedicated tools, summing to around €377 billion), the EU only reaches about **a third of China's subscribed guidance-fund capital** and under a third of its target pool, and the broader EU figure is itself inflated for this comparison since it blends infrastructure, SME and sustainability financing with the much narrower slice that actually functions as growth-stage equity, much as the figure for China isn't purely tech scale-up capital either but spans broader industrial policy goals, a point underscored by the fact that a single sectoral vehicle like China's 2024 "Big Fund III" for semiconductors, at roughly €44 billion in registered capital, is already larger than the EU's entire dedicated scale-up toolkit put together, which is why even a partial reallocation of the proposed €234 billion ECF toward dedicated equity – say €80 billion – would meaningfully triple the EU's current firepower without coming anywhere close to matching China's subscribed capital, let alone its stated ambitions.

If one adds pension funds, however, the EU clearly would possess a substantial financial infrastructure capable of supporting innovation and industrial investment (Table 2); however, these resources remain distributed across multiple programmes, institutions, financial instruments and policy objectives. The resulting system provides significant financing capacity, but only a limited and identifiable fraction constitutes strategically concentrated, discretionary patient capital aimed at creating globally competitive technology and industrial champions.[18]

Table 2. New dedicated EU scale-up instruments.

Instrument	Capital committed (€ billion)	Target capacity (€ billion)	What it means
EIC Fund	4.0	4.0	Government-VC instrument (est. 2020) investing directly in innovative firms alongside private investors. Target capitalisation exceeds €4 billion, of which approximately €1.4 billion have already been invested. It targets Series A+ deep-tech, with tickets in the range of €0.5–10 million for the "Accelerator" program; or €10–30 million for the "STEP Scale Up" program, established in 2024.
SEF	1.0	5.0	Expected operational in 2026. It employs a direct equity model targeting Series B+ companies, with tickets of around €100 million. The EU acts as anchor investor (with €1 billion dedicated from EU budget), while the fund will be managed independently by EQT. It aims for a total fund size of approximately €5 billion.
ETCI 1.0	3.9	3.9	Fund-of-funds managed by the EIF, established with approximately €3.9 billion in initial resources. It backs large VC/PE funds (>€1 billion capacity) investing in Series C+ growth companies. It aims to separately mobilise up to €20 billion in broader investment capacity (excluded from the target-capacity total).
ETCI 2.0	1.25	15.0	It expands access to smaller funds, above €300 million capacity. Approximately €1.25 billion in EIF/EIB commitments, targeting a capacity of around €15 billion. It carries an ambition to mobilise up to €80 billion in broader investment capacity (excluded from the target-capacity total).
Grand total	10.15	27.9	

Table 3. Broader EU ecosystem.

Programme/ Institution	Traceable amount	What it actually means
EFSI (2015-2020)	€102 billion financing approvals	EIB and EIF financing approvals mobilised under the EFSI. Associated total investment mobilisation (including private and public co-financing) reached approximately €540 billion.
InvestEU (EFSI successor)	€84 billion approvals	Successor to EFSI, spread across infrastructure, SMEs, social investment, sustainability and innovation. Associated total investment mobilisation reached €397 billion so far, again including private and public co-financing.
EIF (institution-wide)	**~€90.35 billion assets under management (excluding EFSI/ InvestEU/ETCI)** Calculation: +€164 billion assets under management (end-2025) −€35 billion of approved agreements under InvestEU managed by EIF −€33.5 billion of EFSI funding approved under EIF −€5.15 billion committed anchor capital (so far) under ETCI 1.0 and 2.0	The EIF's total intermediation platform, only partly channelled through EFSI/InvestEU/ETCI. Also includes legacy programmes (COSME, InnovFin) and a wide range of instruments (guarantees, securitisation, credit) beyond equity and VC.
Grand total	€276.35 billion	*Simple sum, included for reference only.*

3.2 The scale-up financing gap with China

The scale-up gap between the EU and China comes out to approximately **€415.75 billion**, calculated as follows: China's 2,023 government guidance funds had subscribed RMB 6.44 trillion (€790 billion) by early 2025, out of a cumulative target pool of RMB 10.39 trillion (€1.27 trillion); against this, the EU can currently point to at best €304.25 billion in broader EU-level financing capacity (the cumulated target capacity of €27.9 billion of EIC fund, SEF, and ETCI 1.0/2.0; EFSI's €102 billion in EIB/EIF approvals; InvestEU's €84 billion in investments; and the remaining €90.35 in EIF's in assets under management), plus a further €70 billion of the maximum ECF InvestEU guarantee that could be drawn from a the proposed €234 billion European Competitiveness Fund toward scale-up-relevant financing; subtracting both of these from China's subscribed total (€790 billion − €304.25 billion − €70 billion), leaves a residual gap of **€415.75 billion** that the EU would still need to close to match China's currently-committed guidance-fund capital.

This is the headline figure, but it rests on a generous framing: it credits the EU with its entire broader financial ecosystem (much of which funds infrastructure, SMEs and general policy objectives rather than scale-up equity specifically) against China's dedicated industrial and venture-capital guidance funds, so a stricter apples-to-apples comparison using only the EU's dedicated scale-up equity tools (~€26 billion) plus the same €70 billion ECF allocation would put the true gap closer to **€692 billion** against subscribed capital, or as much as **€1.17 trillion** if benchmarked against China's full €1.27 trillion target pool rather than what it has actually subscribed so far.

The ECB estimates that the eurozone pension fund currently amounts to approximately **€3.6 trillion**, almost doubling in percentage relative to eurozone GDP from 13% in 2008 to 25% in 2019.[19] Closing the EU–China scale-up gap through pension capital requires different shares depending on how narrowly the gap and the pension pool are defined. Using the headline €415.75 billion gap (China's €790 billion subscribed guidance-fund capital minus the EU's €304.25 billion in broader financial instruments and a hypothetical €70 billion ECF allocation) against the ECB's €3.6 trillion euro area pension pool works out to about **11.5% of assets**. Tightening the comparison to count only the EU's dedicated scale-up equity tools plus the potential €70 billion ECF equity allocation, without crediting the broader ecosystem, raises the gap to €692 billion and the required share to about **19%**. Matching China's full €1.27 trillion target pool instead of its subscribed capital pushes the figure to around **32%**.

The required share also moves with the pension base used. On the narrower €2.7 trillion EIOPA figure, which covers only occupational funds, the same three scenarios need roughly 15%, 26% and 43% of assets. On the broader €6.6 trillion estimate, which folds in the EU-invested share of insurance-based pension savings, they fall to about 6%, 10% and 18%. On the pan-European **€10.3 trillion** figure tracked by IPE, which includes UK, Swiss and Norwegian funds alongside EU ones, matching subscribed capital takes under 8% and matching the target pool **under 13%**.

The honest range runs from a single-digit share of the broadest pension pool to close to half of the narrowest one. The figure worth focusing on is the strict comparison against the ECB's €3.6 trillion base: about 19%. It avoids crediting the EU with unrelated financing instruments and avoids excluding insurance-based savings that meaningfully understate the capital actually available.

The scale of the pool is not really the constraint. EU pension funds contributed **just 5% of capital raised by European VC funds as of 2023, compared with over 50% in the USA**. Even diverting 1% of the EIOPA-defined €2.7 trillion pool, about €27 billion, would roughly double the EU's current dedicated scale-up total. The EU has substantial financial infrastructure behind it: pension and insurance assets alone dwarf every figure discussed so far. What's missing is a coordinated mechanism, on the scale of ambition of the ECF or China's guidance funds, capable of redirecting even a modest share of that capital

toward patient, growth-stage equity rather than the low-risk, fragmented defaults it currently sits in.

3.3 The three legs of dedicated scale-up financing

The EIC Fund, established in 2020, is a GVC instrument investing directly in innovative companies, alongside private investors. The European Commission and the EIC board define the strategic orientation, while portfolio management is conducted by an external – commercial – fund manager, supported by the EIB in an advisory role. The EIC fund provides patient capital, with investment horizons typically extending over 7-10 years, and targets companies from Series A onwards, including deep-tech scale-ups. The fund combines blended finance and equity instruments, with equity investments generally ranging from €0.5 to €10 million under the EIC Accelerator and €10-30 million under the STEP Scale Up (which was established in 2024). Its portfolio is diversified across sectors, including advanced manufacturing, AI and digital technologies, health, energy, climate technologies, and semiconductors. The EIC Fund has a target capitalisation exceeding €4 billion and has already invested approximately €1.4 billion, while seeking to mobilise additional private co-investment.

The EIC Fund takes direct equity stakes in deep-tech firms through its Accelerator, making it the closest institutional analogue to a state equity investor at the firm level. Like direct investment GGFs, the EIC actively shapes deep techs through direct and indirect investment across the entire funding chain and as such embodies a move from fixing market failures to steering technological outcomes, including backing firms with the explicit ambition of producing globally competitive "unicorns" in strategic sectors. This is a paradigmatic change in EU economic governance, where markets are no longer just enabled but actively used as instruments of industrial and technological strategy. At the same time, as Mocanu and Thiemann (2024) show, the EIC's role remains constrained and contested. Its market-directing ambitions generate ideological tensions within the EU, face coordination problems across member states and operate within a fragmented multi-level system where national interests shape outcomes.

Unlike GGFs, the EICF does not impose binding constraints on fund managers: sectoral priorities; geographic investment requirements; reinvestment ratios; and state participation in investment committees or supervisory roles. This represents the result of political struggles: member states rejected France's proposal of a European innovation agency modelled after US DARPA because of its top-down approach to determining what technologies or sectors to target, which fuelled concerns that France and Germany would dominate this choice (Mocanu and Thiemann 2024). Had France prevailed, EIC would have been virtually identical to a Chinese direct investment GGF.

Although the EIC represents a more interventionist turn within the EU's innovation architecture, taking equity stakes and supporting companies throughout the full innovation cycle, from pre-seed to scale-up, it typically participates through co-investments and syndication, with the explicit aim of crowding in private capital rather than substituting it. Rather than replacing what the EIF already does, the EIC was built to sit just upstream of it. Think of it as an attempt to smooth out a particularly fragile stretch of the journey. The EIC steps in when ideas are still too risky, too capital-intensive, too slow-moving for most VC funds to touch. It helps firms get to a point where they look less like experiments and more like investable companies. The hope is that, once they cross that threshold, the rest of the system takes over. The venture funds backed by the EIF pick them up, scale them and carry them forward.

The SEF, expected to become operational in 2026, is designed more specifically to address the late-stage financing gap. Unlike the EIC Fund, it focuses primarily on Series B and later-stage companies through a large-scale direct equity investment model. The European Commission acts as an anchor investor, while the fund will be managed independently on a commercially driven basis by a private fund manager (EQT). It targets long-term equity investments, with individual transactions in the range of €100 million, and focuses on strategic

sectors including AI, quantum technologies, semiconductors, clean technologies, advanced manufacturing, space, mobility and life sciences. The fund will receive €1 billion from the EU budget and aims to reach a total size of approximately €5 billion through additional public and private capital.

This fund targets the hypertransformation bottleneck more directly, but it remains a market-based instrument rather than a European equivalent of China's guidance-fund system. In institutional terms, the SEF has a strong a strategic-technology orientation (like GGFs) and sits under the EIC Fund umbrella, although the companies the EIC has already identified, vetted and supported through its grant and equity instruments do not automatically flow into the scaleup fund, and the fund manager retains full commercial discretion over what to back. Indeed, its independent private fund manager and has no formal or mandatory linkage to the existing EIC portfolio. In May 2026, the EIC Fund Board selected the PE group EQT as its investment adviser and fund manager to lead the roughly €5 billion initiative. On sectoral specialisation, the SEF has only broad strategic-technology guidelines covering areas such as AI, quantum, semiconductors, robotics, energy, space and biotech. The strategic steer does not have specific allocation targets, however, and the binding decisions sit with a private fund manager whose mandate is to deliver competitive returns.

As such, SEF expands the scale of late-stage equity finance available to European deep-tech firms, and it may help reduce the reliance on US-led funding rounds, but portfolio allocation remains driven by commercial selection within broad strategic-technology guidelines. The same applies to the ETCI: investment decisions are delegated to private fund managers, leverage depends on co-investment, and sectoral outcomes arise from the investable opportunities that markets and managers generate. This is a coherent model for reducing the cost of capital at the margin and keeping promising firms anchored in Europe for longer. It is much weaker as a mechanism for directing capital into sectors where private risk appetite is structurally insufficient, which is precisely where Europe's scaling failures are most concentrated.

The ETCI operates through a different model, functioning as a FoF managed by the EIF. Rather than investing directly in companies, it provides capital commitments to large VC and PE funds investing in growth-stage companies. The ETCI targets later-stage financing rounds, particularly Series C and beyond, and supports funds with investment capacities typically exceeding €1 billion (with ETCI 2.0 expanding access to funds above €300 million). ETCI 1.0 was established with approximately €3.9 billion in initial resources and aimed to mobilise up to €20 billion in total investment capacity, while ETCI 2.0 includes approximately €1.25 billion in EIF/EIB commitments and targets a capacity of around €15 billion, with the ambition of mobilising up to €80 billion in broader investment capacity. Investments are concentrated primarily in digital technologies, particularly enterprise software and AI, although ETCI 2.0 seeks broader European coverage and sectoral diversification.

Launched in 2023, this is a FoF under the EIF. ETCI delegates investment decisions to private fund managers working under commercial incentives with broad thematic guidance but no binding sectoral mandates, no value-chain-specific allocation targets and no systematic link to industrial planning. Investment decisions are thus delegated twice over: first to the fund managers that ETCI selects, and then to those managers' own deal-by-day choices. Sectoral outcomes emerge from market selection rather than administrative direction.

Leverage depends on co-investment, with the second-generation ETCI 2.0 aiming to mobilise up to €80 billion in total scale-up capital from a public anchor of €1.25 billion by crowding in insurers, pension funds and asset managers. Sectoral outcomes, accordingly, arise from the investable opportunities that markets and managers generate, not from any vertical industrial policy-based direction of capital toward designated priorities. By its standards, this has been a successful initiative: ETCI has already invested into 14 mega-funds of over €1 billion and anchored the creation of 11 European unicorns.[20]

Like with EIF, ETCI is geospatially brittle: member states contributing capital frequently expect

proportional domestic returns, generating pressure for geographic redistribution rather than concentrated deployment into the strongest scale-up ecosystems. Early-stage innovation support is politically easier to distribute broadly across member states, whereas late-stage scale-up financing requires concentrated, locally embedded investment decisions that inevitably privilege specific firms, sectors and regions. This creates significant political friction precisely where industrial scaling requires strategic concentration.

3.4 Broader EU-level instruments of relevance for scale-up financing

The EU has built a large system to fund and commercialise innovation, but most of it is not designed to provide scale-up equity, which is where the real hypertransformation bottleneck lies. The EIB and its subsidiary, the **EIF**, complement this system. They do not run Horizon Europe, but they finance more mature projects and help scale companies through loans, guarantees and VC support. The EIF was established in 1996 with the EIB as a market-building FoF, although with some additional functions. Much like a GGF, its core activity is to invest in VC and PE funds rather than directly in companies. In this sense, it operates like a classic FoF: it selects fund managers, commits capital to their funds, and relies on them to identify and grow portfolio firms.

This model allows the EIF to leverage private-sector expertise while expanding the overall pool of risk capital available in Europe. It typically acts as an anchor investor, meaning its early commitment helps attract additional funding from pension funds, insurance companies and other institutional investors that might otherwise hesitate to enter the market. At the same time, the EIF is not a pure FoF in a narrow technical sense. It also plays a major role in guarantee programmes, providing risk-sharing mechanisms that encourage banks and other intermediaries to lend to small and medium-sized firms. Unlike GGFs, the EIF mandate is that of a risk-sharing facility skewed towards increasing risk appetite for private VC, not a policy steer instrument. Moreover, Europe's scale-up problem reflects not only financial fragmentation but also the political economy of intergovernmental governance. EU-level institutions such as the EIF increasingly manage large pools of venture-oriented capital, yet much of this capital remains territorially earmarked through national mandates.

Alongside the EIF, **the Juncker plan (EFSI)**, initiated in 2015 augmented this guarantee function aimed at leveraging limited public resources (€32 billion) to stimulate a total investment of €500 billion. Together with the EIB, these funds entrenched a "market-based, but state-led" (Braun et al. 2018) "investment state" (Mertens et al. 2021) that played a key role in the growth of the European VC market. As Mocanu and Thiemann (2024) put it:

> *Unlike the direct supply of capital by public VC funds driven by national security motivations in the US and industrial policy ambitions in China, the EU has generally opted for an indirect fund-of-fund model whereby the EIF invests in VC firms rather than directly selecting start-ups, leveraging the expertise and networks of private VCs. Until recently, its public interventions were driven by the ultimate goal of making the market financially self-sustainable and turning VC into a high-return asset class appealing to private investors. However, in response to external pressures and domestic enablers, in the last years the EU has increasingly leveraging VC markets for public policy goals by seeking to complete the construction of an integrated investment chain embedded in the pan-European innovation ecosystem.*

However, since the EIF is limited to the early-stage segment in VC funds with a risk profile higher than those financed from the EIF's own facilities, its role in hypertransformation, with its focus on later, growth-stage financing was missing during its early stages. Even as evidence emerged that firms remained exposed to foreign investors at the scale-up stage, interventions remained framed within a market-failure logic, focused on enabling early-stage activity, harmonisation and ecosystem building, rather than concentrating capital for late-stage scaling. The EIF did succeed in strengthening linkages across

national ecosystems, encouraging co-investment and cross-border collaboration among public and private actors. But this did not translate into the genuine integration of capital. National public funds continued to prioritise domestic investment mandates, which meant that capital remained fragmented across countries rather than pooled into large, pan-European vehicles. The result was a system with improved coordination at the margins, but without the scale required to support firms through capital-intensive growth phases. Europe became better at connecting its venture ecosystem, but not at concentrating capital, leaving scale-ups structurally dependent on larger foreign investors.

However, contrary to those who doubted that more public capital would mean more scale-up capital, after 2014 the capital increase and instruments like EFSI allowed the EIF to expand its footprint significantly, even moving further into later-stage financing. Doubling its share of the European VC market from 16% to 30% was not trivial. As Mocanu and Thiemann (2024) show, it signalled a system that was learning, reacting and trying to plug the scale-up gap that had long exposed European firms to foreign acquisition. These changes were complemented by regulatory measures in the context of the Capital Markets Union, which sought to stimulate the cross-border fundraising capacity of the VC market. EIF collaborations with national bodies also resulted in new co-investments and a proliferation of national venture funds, but since EU budgetary resources were small, their use primarily aimed at catalysing private investment; therefore, capital remained dispersed and the "second valley of death" persisted.

Alongside these funds sits **Horizon Europe**, with about €95.5 billion for the 2021-2027 period. Horizon Europe primarily provides grants to universities, research institutes, and early-stage companies. Its focus is on generating new knowledge and supporting early innovation, not scaling companies into global industrial players. The European Commission proposed a budget of €175 billion for Horizon Europe, within the 2028-2034 MFF. A part of this envelope, €68 billion, would be dedicated to funding collaborative research for competitiveness objectives. In the Commission's intentions, this layer, albeit being part of the Horizon Europe Regulation, would fall under the governance framework set by the working programmes of the European Competitiveness Fund (ECF), to increase the alignment with competitiveness goals pursued by ECF.

The ECF is the EU's main framework proposed within the new Multiannual Financial Framework for 2028-34 for priorities like digital technology, clean energy, defence and health. It is not a classic investment fund. Instead, it allocates money across programmes, guarantees and partnerships over several years. The financial scale of the ECF is substantial, although its mobilisation power remains deliberately under-specified. The proposal gives the fund a direct EU budget envelope of €234.3 billion for 2028-2034, divided into €11 billion for cross-cutting instruments and advisory support; €26.2 billion for clean transition and industrial decarbonisation; €20.4 billion for health, biotech, agriculture and bioeconomy; €51.5 billion for digital leadership; and €125.2 billion for resilience, security, defence industry and space. Its main leverage mechanism is the ECF InvestEU instrument, which carries a maximum EU budgetary guarantee of €70 billion, provisioned at 50%, with at least €17 billion of Union support to be delivered through this channel.

Yet the proposal does not say how much total investment this will ultimately mobilise, nor does it earmark a fixed equity allocation. Equity and quasi-equity are authorised, including for the Scale-Up Facility, alongside venture debt, loans, guarantees and blended finance, but they sit inside a broader toolbox that also includes grants, procurement, budgetary guarantees, advisory services and industrial-policy coordination. This is therefore not a European version of GGF in the narrow sense of a large public equity vehicle. It is a mixed-instrument derisking platform, the public balance sheet of which is meant to crowd in PE funds, corporates, pension funds, insurers and other long-term investors, while leaving the exact split between equity, debt, guarantees and grants to future work programmes and implementing partners.

Along with the ECF, the Commission aims to introduce a **Competitiveness Coordination Tool (CCT)**. This new coordination framework has the ambition to align research and investments at the EU and Member States level, working in conjunction with the European Semester (the traditional EU's framework for monitoring and coordinating economic, fiscal, and employment policies)[21]. While details on the future governance of the CCT are still lacking, the Commission has already identified several priority areas: artificial intelligence, clean transport and electric mobility, batteries and energy storage, energy infrastructure, chemicals, biotechnology and medical technologies, the bioeconomy and bio-based materials, construction and housing, the circular economy and secondary raw materials, and semiconductors and advanced chips[22].

Most **national and regional GVCs** emerged following the Lisbon Strategy in the early 2000s, predating their Chinese counterparts by over 15 years. At the national level, Germany's government venture architecture operates on a markedly different scale from China's guidance funds. As Moretti (2025) shows, rather than assembling massive pools of state-directed capital, German policymakers built a distributed set of instruments intended to correct market failures while preserving private-sector primacy. The emphasis fell on coordination, financial sustainability and arm's-length governance rather than strategic allocation. The result is a system that is institutionally sophisticated but modest in size when viewed against the multi-billion-dollar Chinese vehicles that routinely anchor entire industrial ecosystems. The country's flagship direct instrument, the High-Tech Gründerfonds (HTGF), emerged in the aftermath of the dot-com crash as a PPP designed to inject risk capital into the earliest stages of technological development. Structurally separate from the development bank KfW and operating with the autonomy of a private venture fund, HTGF concentrates on seed investments precisely where private investors tend to withdraw. Its resources are predominantly public, complemented by a minority but expanding corporate contribution. Fund sizes have grown gradually, from roughly €270 million in the mid-2000s to over €400 million for the latest vehicle, signalling institutional continuity rather than a dramatic scaling effort.

Germany paired this direct strategy with an indirect one through the ERP-EIF facility, which channels public money into privately managed venture funds. Since the mid-2000s, this programme has mobilised slightly more than €5 billion for innovative firms, typically providing about a quarter of a fund's capital and thereby attracting private limited partners. At its peak, the facility supported roughly half of the VC flowing into German startups and helped professionalise an industry that had previously been thin and fragmented. The contrast with France is instructive but the comparison with China is starker still. French programmes deployed well over €10 billion into startups during roughly the same period, whereas German commitments hovered around €6 billion. Yet even these figures appear restrained next to Chinese guidance funds, the individual vehicles of which often exceeded the size of Germany's entire federal effort. What emerged in Germany then, Moretti shows, was a market-amplifying system that reduced early-stage risk and crowded in private finance, while largely abstaining from directing capital toward specific technologies. Chinese GGFs, by comparison, operate as instruments of strategic steerage embedded within national industrial policy. The divergence therefore lies less in state capacity and more in political comfort with directional power.

Europe's innovation system continues to produce world-class research, and in some cases, universities rival or outperform corporations in frontier technologies. In 2023, institutions such as Delft University of Technology significantly increased their share of quantum computing innovations, while DTU and RWTH Aachen ranked among top innovators in the wind and quantum fields. This reflects a distinctive feature of the European model: universities are not only centres of discovery but increasingly active players in commercialisation. Organisations such as Fraunhofer Venture in Germany and the Gemma Frisius Fund in Belgium exemplify this approach, providing structured support for spin-offs emerging from academic research. These institutions aim to convert scientific breakthroughs into viable

firms, often through early-stage seed capital and technology transfer mechanisms.

DTU offers a particularly clear illustration of how this system works in practice. Its innovation model is built around a layered financing architecture designed to bridge the well-known "valley of death" between research and market. At the earliest stage, DTU Skylab provides non-equity grants and mentoring to help researchers develop proof-of-concept technologies. This support allows projects to reach a level of technical maturity where they can attract external capital. From there, ventures often transition into PreSeed Ventures, which combine university deal flow with professional VC structures. Early-stage firms backed by these vehicles have historically progressed into larger funding rounds, eventually drawing in Nordic and international investors.

More advanced funding vehicles, such as PSV Hafnium, extend this pipeline into later-stage deep-tech investment, with a strong focus on climate technologies. These funds are often anchored by public institutions like the EIF, the participation of which helps crowd in private investors such as pension funds and corporate partners. The result is a relatively coherent pathway from lab to market, particularly in sectors like clean energy, where DTU-linked firms have developed technologies for fuel cells, wind optimisation and energy analytics. However, scale remains a constraint. While institutions like Fraunhofer Ventures continue to generate promising technologies in areas such as electric powertrains and battery systems, their financial resources remain modest compared to global competitors. This limits their ability to translate technological strength into industrial dominance, highlighting a persistent gap between Europe's innovation capacity and its ability to scale.

How does the GVC ecosystem function and perform? A recent mapping exercise by Testa et al., covering 128 government agencies and 392 public VC programmes across 11 European countries, found that government-backed investors accounted for roughly 31% of total VC investment over 2007-2021 (Testa, Quas and Compañó 2024). In some countries, the figure is far higher: Belgium at 82%; Ireland at 64%; and Finland at 71%. Public money is structurally embedded in European VC functioning, making this quite different from marginal market correction. But the same data establishing the scale of government involvement reveals why it may not achieve policymakers' assumptions.

The system has a design problem. European GVC has been built to fill gaps rather than lead markets. Much of the capital flows through indirect channels, FoF structures, co-investment platforms and syndicated deals with private VC. Institutions like the EIF play a central role here, de-risking early-stage investment and expanding the overall volume of VC. The EIC adds a more direct layer, but even there, ticket sizes and portfolio construction remain relatively cautious. The result is a system that is deep but thinly spread. It reaches many firms, supports ecosystem development and smooths out market cycles. It performs well on coverage and continuity. It performs less well on concentration. There are relatively few instances where European public capital takes large, decisive positions in firms or technologies and follows through across multiple funding rounds to scale. Worse still, the GVCs pursue overlapping mandates: economic growth; job creation; innovation; internationalisation; and increasingly social and environmental objectives. Most run multiple programmes simultaneously, mixing equity with loans and guarantees. Programme structures differ significantly: whether investing directly or through private funds; requiring private co-investors; operating with fixed lifetimes or as evergreen funds; and targeting specific sectors, stages or geographies.

If hypertransformation support is about taking long equity positions in hard-tech startups and accompanying them into the accelerated growth phase, this dizzying mosaic of layered mandates is detrimental to the objective of scaling technical innovation in Europe. Indeed, 80% of initiatives have no defined industry focus, and the overwhelming majority concentrate on early-stage companies (Testa et al. 2024). This orientation addresses information failures and thin private markets where intervention cases are easiest. But despite the public

system's scale, it systematically targets the financing chain's beginning rather than middle or later stages where industrial scaling happens.

The National and Regional Partnership Plans (NRPPs) aim to align national and EU spending by integrating cohesion, agriculture, social policy, migration and elements of industrial competitiveness into a single programming framework linked to EU priorities. What they do not do is create new pools of risk capital or establish mechanisms for channelling large-scale equity into capital-intensive sectors. Instead, NRPPs work through conditionality, co-financing rules and compliance milestones. Their logic is horizontal and distributive, balancing competing objectives across member states rather than concentrating resources in specific industries. They move the EU toward a more coherent multi-level governance architecture without approximating the function performed by GGFs, which operate as vehicles for concentrated, patient, sectorally targeted risk capital tightly linked to industrial strategy.

Grant-based public expenditure concentrated in strategic sectors can lower the cost of technological development, reduce private risk sufficiently to unlock follow-on investment and sustain firms through the early stages of commercialisation that precede bankability. If coordinated effectively across the ECF's sectoral windows and linked systematically to Horizon's research pipeline, they could accelerate cluster formation even without equity. The NRPPs, for all their limitations as innovation finance instruments, reduce the fragmentation between Brussels-level priorities and national implementation that has historically weakened EU industrial policy at the point of execution. The question is whether the crowding-in logic embedded across this architecture is sufficient in sectors where private risk appetite is not merely thin but structurally absent, and where the competitive challenge comes from a system that does not wait for private validation before directing capital.

4. PRELIMINARY (TRANSFERABLE) LESSONS FROM CHINA

4.1 Expand scale-up financing

A central limitation of current European debates on GVC is the tendency to frame the problem primarily as one of coordination rather than scale. While fragmentation across national funds, regulatory systems and investment ecosystems undoubtedly reduces efficiency, even a perfectly coordinated European VC architecture would still mobilise substantially smaller pools of patient risk capital than those available in the USA or China. The challenge is therefore macro-financial as much as institutional. Better alignment between the EIB Group, national promotional banks, sovereign vehicles and regional funds may improve allocation efficiency, yet coordination alone cannot generate the order-of-magnitude increase in long-duration financing required by sectors such as semiconductors, batteries, AI infrastructure, fusion or advanced manufacturing. Europe's scale-up problem ultimately reflects the limited size of available patient-capital pools that could actually (rather than theoretically) be mobilised relative to the capital intensity and long commercialisation horizons of strategic technologies.

Policy discussions surrounding pension-fund mobilisation often underestimate the political and institutional barriers involved in redirecting long-term savings toward venture and scale-up finance. While Scandinavian cases demonstrate that greater exposure to illiquid innovation assets is possible under specific institutional conditions, broader European reform efforts continue to face significant resistance from regulators, fund managers and political actors concerned about risk exposure and fiduciary responsibilities. The challenge is therefore not merely technical but deeply political, reflecting divergent national models of financial governance, welfare capitalism and risk distribution. Expectations that pension reform alone will generate transformative increases in European scale-up finance may therefore overstate the political feasibility of such reforms in the medium term.

China's GGFs routinely deploy large ticket sizes into firms at the scale-up phase, supporting gigafactories, supply-chain integration and global expansion. In contrast, Europe faces a well-documented scale-up gap, as a result of which, many European startups relocate or rely on foreign capital once they require larger funding rounds. This European woe is augmented by the fact that European corporates allocate massive resources to American VC funds and startups. Capital can hardly be made to show its flag, as it were. As companies approach the need for several hundred million euros or more, domestic pools become insufficient. This creates ownership dilution, relocation pressures or strategic vulnerability in sectors where control matters.

Addressing the scale-up gap does not require institutional rupture. It requires redesigning existing instruments for greater depth and continuity. A reinforced European Scale-Up Fund (ESF) could be structured as a much larger, multi-cycle vehicle, taking substantial anchor positions. The architecture should incorporate three elements. First, significantly larger average ticket sizes, allowing the fund to participate meaningfully in rounds between €200 and €500 million. Second, the ESF should have large built-in follow-on reserves so that public capital can defend positions across multiple growth stages. Third, it should have strong structured syndication rules that invite private institutional investors, including pension funds and insurers, without making their participation a precondition for deployment. InvestEU guarantees and General Block Exemption Regulation safe harbours can reduce perceived risk and accelerate approvals. Important Projects of Common European Interest (IPCEIs) should feed into this scale-up platform, ensuring that firms benefiting from early public support have access to later equity rounds within Europe.

Aggregation is therefore a structural necessity for ESF and beyond. The EIF provides a natural platform for consolidation, transforming selected EIF windows into large-scale strategic platforms with multi-cycle mandates able to "breed" European superscaler industrial firms. The Chinese case suggests that sector-dedicated FoF structures with capital commitments in the tens of billions, endowed with the requisite engineering, not just financial expertise for the targeted technologies, can finance companies from early growth to the industrial scale, reducing the gap to Chinese superscalers in high-value-added industries.

Europe does not need to (and cannot) replicate China's centralised and highly dirigiste developmental state that is steeped in a party-state political project and vast state ownership (Saltmarsh 2025) to achieve meaningful scale. As the next section shows, it needs to target more efficiently what it already has, commit for longer horizons and design vehicles that match the capital intensity of the industrial technologies of tomorrow not just to be resilient to Chinese competition but to leapfrog China, much like this country leapfrogged some of Europe's most advanced industrial niches.

4.2 Concentrate scale-up financing

4.2.1 Connect universities and VC more systematically

By 2019, observers recognised that China had become a "superscaler" not through higher startup productivity but through extraordinary capital concentration (Onetti and Haeming 2019). Only 0.4% of Chinese firms absorbed 38% of total funding – nearly double Europe's equivalent share. This degree of concentration enables firms to move from prototype to industrial dominance in capital-intensive sectors. Europe distributes capital much more diffusely across firms and territories, which works for software but fails for batteries, semiconductors or advanced manufacturing where sustained, concentrated investment determines outcomes.

European public VC remains largely generalist, spreading resources across technologies and regions rather than focusing on particular sectors (Testa et al. 2024; Li and Ban 2026). This matters because capital-intensive technologies require concentrated investment to reach industrial scale. When public money is dispersed too thin, firms end up relying on foreign capital once they need larger rounds, which is precisely what happens repeatedly across European deep tech.

The legal framework does not prevent Europe from concentrating capital. The Market Economy Operator principle requires commercial behaviour, not sectoral neutrality. Funds dedicated to clean energy, semiconductors or industrial biotech can meet market standards through professional management, diversified portfolios and credible returns. Private funds specialise constantly. A European public equivalent is legally possible. The barrier is political: deciding which sectors deserve concentrated backing and then committing accordingly.

The most impactful reform involves redesigning mandates under the Multiannual Financial Framework and InvestEU. Each cycle should identify five to seven strategic value chains where capital intensity, geopolitical exposure or decarbonisation urgency justify concentration. IPCEIs should serve as the trigger. Once member states designate sectors as strategic and worthy of state-aid exemptions, that designation should extend to equity, activating jointly governed investment platforms pooling EU and national capital. Every major IPCEI could include a matching scale-up platform managed through EU-level venture structures, linking industrial road maps directly to capital allocation (Schmitz et al. 2026; Seidl and Schmitz 2024; Breznitz and Gingrich 2025). General Block Exemption Regulations could provide clear safe harbours for sectoral funds meeting governance standards, removing legal uncertainty and accelerating deployment.

Chinese GGFs achieve impact through geo-spatial coordination with regional ecosystems. They support clusters, suppliers and local upgrading as connected sequences rather than parallel activities. Europe

possesses similar ingredients (regional development agencies, innovation clusters, promotional banks, EU financial instruments), but they operate side by side rather than as coordinated pipelines. Instead of programming Cohesion Policy, Horizon Europe, InvestEU and the Innovation Fund separately, each cycle could focus on limited strategic value chains and align regional programmes accordingly. Regions seeking support for batteries or hydrogen would need to demonstrate how projects fit European road maps and how funding moves from regional grants to national equity to scale-up finance backed by the EIF.

Targeted adjustments to state aid rules should expand safe harbours for regional co-investment funds following common standards and investing in agreed value chains. Existing regional alliances between university consortia, firms and industrial parks could integrate into EU-level sector platforms with access to guarantees and financing tied to cross-border cooperation and data sharing. Demand-side tools including coordinated procurement and carbon contracts for difference should reinforce these efforts, ensuring firms access markets alongside capital. The result can be coherent multi-level coordination where regional, national and European instruments follow a shared direction rather than pulling apart.

Europe must decide which sectors justify concentrated capital and accept that supporting everything equally dilutes impact. But specialisation does not require competition rules to be abandoned. It only means flexibilising them so that strategic industries benefit from coordinated financial firepower and that fragmented funding disadvantages European firms in capital-heavy sectors where Chinese rivals receive concentrated backing.

Concretely, Europe should strengthen the directive capacity of European innovation at the equity end while using other grant and guarantee instruments to de-risk specific sectors where private capital will not engage without sustained public commitment. State-owned energy companies, infrastructure firms and promotional banks could be equity investors in scale-up funds, thus becoming analogous to Chinese SOEs, without nevertheless requiring the EU to replicate China's property regime that it neither possesses nor could readily construct. This pivot could align available instruments more precisely with competitive challenges, deploying public capital as a form of financial statecraft challenges rather than treating them as disconnected functions.

Critically, however, the path forward requires the assumption that generalist, fragmented funding serves innovation equally across all sectors to be abandoned. Capital-intensive deep tech requires different architectures. Europe organises innovation differently, and that difference often gets misread as decline. In fields like quantum technologies, the system leans heavily on public research institutions. Garcia-Herrero and Krystyanczuk (2025) showed that places like the Commissariat à l'énergie atomique, alongside universities such as those in Aachen (RWTH), Delft and Valencia, accounted for roughly 60% of the EU's most radical breakthroughs. That is a large share by any standard. It reflects a model where the frontier often begins in publicly anchored ecosystems, with deep scientific capacity and long-term horizons. Private firms occupy a smaller share of that early-stage space than in the USA or China, particularly in the AI and semiconductor fields.

Where Europe (but also the USA) scores lower is in the private sector. Chinese firms in the global top ten most innovative firms (by international patent filings) generated 12,441 international patent filings in 2024, more than three times the combined total of the US's sole entrant, Qualcomm, and Japan's top firms, and more than six times the filings of Europe's only representative, Sweden's Ericsson, among published international patents (PCT applications). For context, the business sector accounts for 89.1% of the total, followed by the university sector (5.6%), individuals (3.5%), and the government and public research organisation sector (1.8%); the top is dominated by Chinese and American firms. The implication is this: if patent industrialisation is largely a game of corporates, and in Europe these corporates aren't great at it (in contrast to universities and public research institutions), maybe the EU capitalises on

what works, often despite national budget cuts to universities.

As this study showed, Chinese university-linked venture structures connect research to finance in a continuous chain, supporting spin-offs at the seed stage and then channelling successful firms into larger public funds. Europe has many of the same pieces, from strong universities to technology transfer offices and public investors, but they are not well connected. Nor do they have GVCs of their own, like China does. Too often, promising research projects move from the lab to market through a series of improvised steps, relying on ad hoc funding rounds and fragmented venture ecosystems. In practice, this could take the form of dedicated deep-tech funds linked to major technical universities and backed by national promotional banks and the EU-level GVCs discussed above. The goal is not to replace private capital, but to ensure that early-stage public support connects smoothly to later-stage growth financing, reducing the risk that firms stall or relocate when they need to start or scale.

Several national examples show both the potential and the gap. Denmark has strong university-linked financial ecosystems around the DTU, yet the transition to larger European capital pools remains uneven. Germany's Fraunhofer Institutes excel at funding applied research. The EIF could anchor this by creating thematic deep-tech investment windows tied to leading university research networks, with long-term mandates, co-investment from national institutions and built-in follow-on capacity. Structured this way, universities would feed into national funding platforms, which in turn connect to EU-level growth capital, forming a continuous escalator rather than a series of disconnected steps. Academia is ripe for this: according to the European Patent Office, most European academic patents are already what researchers call "indirect" patents: inventions involving university researchers but filed through firms, collaborative labs, hospitals or industrial partners. At the start of the 2000s, indirect filings outweighed direct university filings by nearly four to one.

4.3 Mobilise national SOEs to become sources of scale-up capital

A closer look at China suggests that using SOE balance sheets for innovation finance should not be out of reach for Europe if the investments are properly derisked on both the investment and demand sides. Member states already control large public companies, receive steady dividend flows and can influence capital allocation through ownership. In principle, part of these resources could be redirected into venture and scale-up finance. The (mostly) state-owned public utilities, grid operators and infrastructure firms could act as cornerstone investors in climate and deep-tech funds, expanding the pool of patient capital without adding directly to fiscal deficits. The real difference with China is not the conversion of "stale" SOE capital into scale-up risk capital, but the level of coordination.

In China, SOEs, state financial institutions and public funds operate within a tightly aligned system that channels capital toward strategic sectors at scale and over long-term horizons. Europe's system is more fragmented: ownership is national; firms operate under commercial and competition constraints; and public investment must satisfy market-conformity rules.

This coordination can be strengthened. Altered SOE governance frameworks could allow public enterprises to invest a share of retained earnings into professionally managed growth funds, reducing political risk while maintaining commercial discipline. Cross-border SOE co-investment should be incentivised via IPCEI structures so that national capital aggregates into European-scale vehicles rather than remaining siloed. This would entail member states adjusting how they view their public enterprises, incorporating long-term innovation and ecosystem development into ownership strategies, while maintaining strict transparency and evaluation standards.

4.4 Limitations of the comparison

4.4.1 Governing fragmentation

Both Europe and China exhibit territorially fragmented innovation finance systems. The difference lies in the governance structure surrounding fragmentation. In China, local experimentation occurs within a hierarchical political system capable of disciplining, restructuring or recentralising investment mechanisms when strategic priorities shift. Europe's fragmentation, by contrast, is embedded within intergovernmental bargaining structures where concentrated capital allocation frequently generates political resistance from member states seeking territorial balance.

China also faces profound territorial fragmentation in the organisation of innovation finance. Local governments established overlapping GGFs, duplicated industrial priorities and frequently transformed innovation vehicles into quasi-infrastructure instruments tied to regional growth objectives. Yet fragmentation in China operates within a fundamentally different political architecture than in Europe. The Chinese system is best understood through the logic of what political scientists have called "fragmented authoritarianism", where extensive local experimentation and competition are tolerated, and often encouraged, as long as they do not undermine central strategic priorities (Gomes and ten Brink 2023). Provincial and municipal authorities, therefore, possess considerable room to manoeuvre in designing local industrial strategies; supporting favoured firms; and mobilising investment ecosystems around universities, industrial parks and manufacturing clusters. At the same time, this decentralisation remains conditional rather than constitutionally entrenched. When local experimentation begins generating outcomes viewed in Beijing as inefficient, financially destabilising, excessively duplicative or strategically misaligned, central authorities retain the capacity to intervene selectively through regulatory tightening, restructuring campaigns, recentralised investment mandates or the outright closure of poorly performing funds. Recent crackdowns on underperforming GGFs and the introduction of centralised evaluation systems illustrate precisely this capacity for hierarchical correction.

The contrast with Europe is significant because European fragmentation is embedded within the institutional legitimacy of the EU itself. Member-state territorial balancing is constitutive of the EU's political architecture. As a result, fragmentation in Europe is far more difficult to discipline strategically. EU-level institutions may centralise elements of venture financing through bodies such as the EIF or the EIB, but capital allocation remains persistently shaped by national mandates, geographic redistribution pressures and intergovernmental bargaining. This difference becomes particularly consequential during periods of industrial hypertransformation because technological scaling naturally rewards concentration.

Successful ecosystems accumulate cumulative advantages through supplier networks, specialised labour pools, logistics infrastructure, universities, engineering capabilities and dense financial ecosystems. China increasingly accepted this dynamic, allowing clusters such as Shenzhen, Suzhou, Hefei, Hangzhou and the Yangtze River Delta to emerge as highly concentrated scaling ecosystems despite official rhetoric around balanced regional development and shared prosperity. Europe, by contrast, remains structurally ambivalent toward concentration because its political legitimacy depends heavily on territorial inclusion and distributive balance across member states. The result is a recurring tension between the economic logic of industrial scaling, which favours the concentration of capital and capabilities, and the political logic of European integration, which continually pushes toward geographic dispersion and negotiated compromise. This helps explain why many European scale-up instruments evolve into hybrid structures attempting simultaneously to support strategic concentration while preserving intergovernmental equilibrium.

4.4.2 Not all scale-up gaps look the same

Europe and China confront inverse versions of the scale-up problem. Europe performs comparatively well in seed and early-stage financing but remains dependent on non-European investors for large late-stage growth rounds. China historically faced the opposite challenge. Its state banking system, policy banks and industrial credit mechanisms already provided abundant financing for large-scale industrial expansion, infrastructure and manufacturing capacity. The bottleneck instead emerged in early-stage frontier innovation where technological uncertainty exceeded the capacities of conventional state banking institutions. Government-guided funds thus evolved less as substitutes for industrial finance and more as mechanisms for filling the gaps in high-risk early-stage technological commercialisation.

Europe faces a structural constraint that complicates any direct borrowing of the Chinese model. Public VC serves two competing purposes. It can be used to target strategic sectors, or it can be used to anchor and expand the VC ecosystem itself. In a system where the state cannot easily direct capital flows, the second function becomes critical. Expanding the overall capital base, especially by attracting institutional investors such as pension funds, may matter more than reallocating limited public resources toward specific sectors. This creates a tension at the heart of European policy. Done carelessly, a more directive approach risks undermining the fragile venture and scale-up ecosystem that has taken decades to build and which cannot be replaced by the large Chinese GGFs built on equity from giant SOEs, state banks, insurance companies and so forth. VC depends on high and uncertain returns, and only a small share of funds achieve the performance required to attract private capital at scale. If public intervention becomes too tightly tied to strategic objectives, it may reduce overall returns and deter private participation.

A final consideration concerns the limits of policy foresight. Innovation is inherently unpredictable, and many of the most transformative firms emerge from unexpected trajectories. Technologies that later become strategically central often begin in domains that appear commercially trivial or peripheral. This makes politically driven sector selection difficult, particularly in democratic systems where decision-making cycles are slow. The implication is not that industrial policy should avoid prioritisation, but that it must remain flexible and become implemented via more reflexive, experimental, high-capacity forms of state intervention) Seidl and Wuttke 2025). Seidl, Timo, and Tobias Wuttke. "Picking sectors: IPCEIs and Europe's emerging state capacity for strategic identification." *Politics and Governance* 14.14 (2025).

4.4.3 Can SAP be Tencent?

One major lesson for Europe from the Chinese experience is that scale-up ecosystems are not built through finance alone. They emerge through the interaction between concentrated capital, platform infrastructures, industrial coordination and ecosystem orchestration. China's large digital platforms, especially Alibaba, Tencent, Baidu and JD.com, became far more than successful technology companies. Under relatively permissive antitrust conditions during the formative expansion phase of China's digital economy, they evolved into ecosystem integrators spanning logistics, payments, cloud infrastructure, mobility, entertainment, AI, fintech and industrial services. As a 2019 report showed,[23] during the 2010s, their corporate venture arms functioned as strategic coordinators capable of embedding startups into dense technological and commercial ecosystems. Startups entering these networks gained more than funding. They accessed cloud systems, digital marketplaces, payment architectures, supplier ecosystems, consumer data, engineering talent and continental-scale user bases that dramatically accelerated scaling dynamics.

Europe possesses excellent industrial firms (SAP, ASML, Siemens, Schneider Electric, Airbus, Spotify, Adyen, Dassault Systèmes), yet none perform the broad ecosystem-integrating role played by Tencent or Alibaba in China. Europe's industrial structure remains siloed: banks finance separately from manufacturers; telecom firms provide connectivity independently; and startups compete for fragmented

national markets without absorption into continent-wide innovation ecosystems. Chinese platform firms helped startups overcome fragmentation by integrating payments, logistics, cloud services, consumer acquisition and industrial ecosystems into unified growth environments. European startups face the opposite dynamic: fragmented digital markets; fragmented procurement systems; fragmented data infrastructures; and fragmented capital markets. Even where financing exists, scaling remains slower because firms navigate institutional discontinuities across member states.

Europe's scale-up challenge cannot be solved through larger VC funds alone. Europe lacks ecosystemic density. Creating the "European Tencents" may be neither politically feasible nor normatively desirable. Rather, Europe may need coordinated industrial-platform ecosystems linking large incumbents, public financial institutions, cloud infrastructures, manufacturing networks, defence ecosystems and scaleups more systematically. Large European corporates could function as ecosystem anchors around which continent-wide networks organise, particularly in the industrial AI, semiconductor, energy system, advanced manufacturing, mobility, cloud infrastructure and defence technology sectors.

This requires rethinking the relationship between industrial policy, financing policy and competition policy. Europe's regulatory architecture has historically prioritised market contestability and anti-concentration, often intervening early against vertical integration or ecosystem dominance (Bora et al. 2026; Ban and Scepanovic 2026). While this protected consumers and limited monopoly power, while defending a level playing field between member states, it constrained the emergence of platform-centred scaling ecosystems capable of sustaining hyperscaling firms. The Chinese experience suggests that technological hypertransformation rewards systems tolerating a higher concentration and ecosystem integration in strategically prioritised sectors. Europe's challenge is whether it can construct coordinated hard-tech scaling that preserves openness, fairness and democratic accountability while still generating the infrastructural density required for technological competition at the continental scale.

5. CONCLUSION

Recognising that the EU and its member states are simply less willing than China to take risks in scaling innovations into industries would shift attention toward the internal reforms that could let Europe leapfrog rather than chase or get defensive against China. The central task is to connect the continent's vast innovation machine to its equally vast pools of public and private capital. Our estimates (Tables 2 and 3) suggest that the more and the faster all EU-level instruments (now reaching above **€304 billion**) get converted into dedicated equity-based scale-up financing tools (now hardly reaching 26 billion euro), the better for EU's chances to make its industrial base stay competitive over the decades to come with a country where 26 billion euro can be the size of just one fund among many.

Indeed, a bold allocation to scale-up equity of the proposed €234 billion European Competitiveness Fund would further reduce the scale-up gap with China. By 2025, €790 billion had been subscribed via Chinese GGFs.[24] The is more than double of the total amount of equity, grants, loans and guarantees that the entire EU ecosystem (not just dedicated scale-up instruments) have committed by 2025 (€304 billion). However stricter apples-to-apples comparison using only the EU's dedicated scale-up equity tools (€28 billion) plus an estimated share of €70 billion for equity in the European Competitiveness Fund allocation would put the true gap closer to **€692 billion** against subscribed capital in China's guidance funds. Only a massive conversion of all EU financing instruments (including the EIB) or a mobilisation of important shares of EU-based pension funds could plausibly close this gap, which puts even more pressure on better coordination and targeting of existing EU financial resources along the lines suggested in this study.

Alongside a negotiated grand trade bargain between the EU and China, the policy agenda hereby proposed would be an economically more resilient and ambitious course than yielding to the temptation to follow the USA into a trade conflict, as some experts have argued (Tordoir and Setser 2025; García-Herrero and Rühlig 2026; Benner 2026). This choice matters because in such a conflict China would hold escalation dominance across domains, as its 2025 trade-war victory over the USA amply demonstrates. Moreover, as whole library shelves of economic history show, trade protections deliver only short-term relief, letting the superior competitor control the export markets one used to depend on; this is an important factor to keep in mind given the EU's export-led growth model (Baccaro and Hadziabdic 2024).

The China comparison highlighted in this study is useful not because Europe should imitate China's system, which operates through very distinctive state coordination levers that Europe neither possesses nor desires, but because it clarifies exactly what is absent from Europe's approach. This study's analysis of GGFs and their links to industrial ecosystems demonstrates that China constructed a comprehensive architecture for hyperscaling technological innovation, for which Europe needs an internal response. This is fundamentally an organisational design rather than capital problem. The central question for European policymakers is whether they will treat the scaling of technological innovation as the infrastructure challenge it actually is, requiring patient capital, specialist expertise, regional industrial ecosystems and institutions designed for scaling, or whether they will continue diagnosing an imaginary cultural problem while neglecting the very real organisational and financial one this study maps out.

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6 “EU loses almost a million manufacturing jobs in just 4 years”. European Trade Union Confederation, 18 March 2024

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10 Zhang, Y. (2025) “China launches national venture capital guidance fund to back long-term innovation: NDRC”. Global Times, 26 December.

11 The Chinese term is “industrialisation rate of invention patents” or “patent industrialisation rate”; in Chinese: 发明专利产业化率. It measures the share of invention patents that have moved into actual production, commercial use or industrial application.

12 “国家制造业转型升级基金二期启动，总规模达1472亿元.” Baidu Baijiahao, 28 May 2024.

13 “国家制造业转型升级基金二期正式启动” . Sina Finance, 12 September 2024.

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18 I thank Fabrizio Franco for the conceptual distinctions made in this section.

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21 “Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions: A competitiveness compass for the EU”. COM(2025) 30 final. European Commission, 29 January 2025. pp. 24-25.

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APPENDIX: OVERVIEW OF EU SCALE-UP INSTRUMENTS

Overview of EU scale-up instruments
By **Fabrizio Franco,** formerly at Business Europe

Program (+ brief description)	Focus on scale-up/late stage	Patient capital	Scale	Funds mobilised	Type of finance	Ticket size (if equity)	Sectorial and geographical concentration	Link with university and research organisations	Ecosystem creation capacity/ interlinkages with other initiatives
European Innovation Council Fund Established in 2020 (STEP Scale Up end of 2024) De-risking program (co-investing by private companies) ~GVC it invests directly in companies (targeting minority equity stakes – typically around 10% but can go up to 25%)[1] "The EIC Fund's main objective is "impact investment" rather than maximising return on the investment" [2] Political steering. EIC board with experts sets the strategy. European Commission/EISMEA, select companies and provide support services. External Fund Manager (Alter Domus) manages portfolio; EIB acts as investment advisor and does due diligence[3]	Partial focus (with STEP Scale Up) From startups to mature scale-ups (TRL 6 to 9) Series A onward	Patient capital, with a long average perspective on the return on investment (7-10 years) with a maximum of 15 years in general[4]	Modest, compared to Chinese GGF, particularly if considering the dispersion across different stages the scale is not negligible Capitalisation of over €4 billion; so far, signed agreement for €1.4 billion[5] (For EIC STEP Scale Up, budget of €300 million in 2026 only) Under the commission proposal for a new Horizon Europe (2028-2034), the European innovation Council would receive €34.4 billion, up from €10.1 billion. This would likely also result in a substantial increase for the EIC Fund, albeit the ongoing negotiations are likely to end up with a smaller budget for Horizon than in the Commission's proposal	3.5×[6]	For EIC Accelerator: Grant (TRL 6-8); blended finance (grant + equity + quasi-equity); Investment only for TRL 9 For STEP: equity only	Not enough to scale-up large deep-tech manufacturing champions €0.5-10 million under the EIC Accelerator €10-30 million under EIC STEP Scale Up[7]. Targets companies seeking major funding rounds, requiring proof of initial market interest from a qualified investor covering at least 20% of the total target funding round[8]	Funding is partially dispersed across a number of sectors, albeit EIC Accelerator Challenges and STEP Scale Up appears more concentrated Geographical spread with certain countries, such as France and Germany (unsurprisingly), showing a degree of concentration. 300+ companies across 25 countries[9] Sectors: advanced manufacturing & advanced materials; agriculture & food; AI, data & ICT; built environment; climate & environmental tech; energy; health biotechnology; medical technologies; mobility; quantum, advanced computing & semiconductors; social innovation, culture & creative industries; and space "EIC Accelerator Challenges" calls are open to proposals in five predefined topics[10] Step scale-up is more focused on digital and deep tech clean technologies & biotechnologies[11]	Indirect link with other initiatives promoting university and RO research: EIC-EIT partnership, with fast-tracking of EIT projects towards EIC fund, and other support services Research-to-market pipeline within the EIC (fast-tracking Pathfinder/Transition feed into Accelerator/STEP). Universities and ROs are the primary beneficiaries of Pathfinder[12]	It provides certain instruments for ecosystem creation, particularly to create information-sharing and link across investors. It might also favour concentration of funding in strategic sectors through STEP seal Business Acceleration Services (BAS): (1) helps companies find customers, partners and investors (2) coaching and mentoring for founders and management High-quality projects financed under the STEP Scale Up get access to a "STEP seal" that facilitates access to diverse funding from the EU budget, favouring the concentration of funding [13]

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2 "European Innovation Council (EIC) EIC Fund Investment Guidelines (Horizon Europe Compartment)". European Commission, 22 April 2021.
3 "About the EIC fund". European Innovation Council.
4 Ibid.
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7 "About the EIC fund". European Innovation Council.
8 "STEP Scale Up". European Innovation Council.
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10 "EIC Accelerator Challenges 2026". European Innovation Council.
11 "Guidance note concerning certain provisions of Regulation (EU) 2024/795 establishing the Strategic Technologies for Europe Platform (STEP)". Communication from the Commission. C(2024) 3148 final. European Commission, 8 May 2024.
12 "EIC Pathfinder Open – lessons from the 2025 results and what's next for 2026". Blog series 2/10. Accelopment, 5 February 2026.
13 "The STEP Seal explained". European Union.

Program (+ brief description)	Focus on scale-up/late stage	Patient capital	Scale	Funds mobilised	Type of finance	Ticket size (if equity)	Sectorial and geographical concentration	Link with university and research organisations	Ecosystem creation capacity/ interlinkages with other initiatives
							Recently also opened to defence [14] Of the 301 companies, the most represented sectors are (author's calculation): medical technologies 27.9%; quantum, advanced computing & semiconductors 13.3%; health biotechnology 11.6%; advanced manufacturing & advanced materials 10.0%		
Scale-up Europe Fund Expected to start investing in Autumn 2026 ~GVC investing directly in companies. The EC acts as an anchor investor, while the vehicle then operates independently EQT chosen as fund manager with commercially based decision-making[15]	Series B onward, late and scale-up phase	Long-term patient capital (no explicit indications of the average expected timing of the investments)	The fund has a similar, expected, dimension to that of the EIC Fund but concentrates these resources more on late-stage/scale-up[16]		Direct equity	Large Investments in the range of €100 million[17]	Funding seems to be quite dispersed across a range of sectors. On paper, there should not be a tight geographical mandate The size of single investments might by default lead investments towards industrial hubs, capable of offering more opportunities. At the same time, commercially based management would probably pursue a diversification strategy to avoid the level of concentration that could be achievable by tight political steering To be seen whether the EU will impose a mandate for geographical dispersion Sectors: digital and intelligent systems, including AI, quantum and semiconductors Physical and industrial systems, including clean energy, advanced manufacturing and materials, space and mobility technologies Life and health sciences, including biotechnology, medical technologies and agritech	Indirect link, through link with EIC Fund ecosystems (EIC projects can be funded by SEF)	Will involve pension funds, asset managers and other private investors Might be an investment target of ETCI

14 Naujokaitytė, G. (2026) "EIC opens first-ever €100M call for defence start-ups". Science Business, 30 June.
15 "Scaleup Europe Fund". European Innovation Council.
16 Ibid.
17 Naujokaitytė, G. (2026) "Five things we know about the EU's new €5B Scaleup Europe Fund". Science Business, 21 May.

Program (+ brief description)	Focus on scale-up/late stage	Patient capital	Scale	Funds mobilised	Type of finance	Ticket size (if equity)	Sectorial and geographical concentration	Link with university and research organisations	Ecosystem creation capacity/ interlinkages with other initiatives
European Tech Champions Initiative Launched in 2023. ETCI 2.0 expected to be launched in late 2026 FoF managed by EIF investing in VC and PE of at least €1 billion (extended to €300 million for ETCI 2.0) ETCI 1.0 crowd-in funds from France, Germany, Spain, Italy, Belgium, and the Netherlands ETCI 2.0 also aims to crowd-in private investors Managed by EIF/EIB, but the choice for investments in companies undertaken by private, commercially driven VC/PE	Growth/Series C and later	Invests in growth-stage VC/PE funds, which then hold portfolio companies over multi-year VC fund life cycles (typically 10+ years)	With ETCI 2.0 would reach a large size ETCI 1.0 €3.9 billion of initial resources, aiming to mobilise €20 billion +€1.25 billion own EIF/EIB funds for ETCI 2.0 (aiming to reach €15 billion in anchor, with the capacity to mobilise €80 billion)[18]	>5× for ETCI 1.0	Equity, deployed indirectly:— EIF/EIB commit capital as LPs into growth-stage VC and PE funds	Large, particularly with ETCI 2.0 Investment by ETCI 1.0 of between €100 million and €400 million.[19] Average investment in companies €60 million[20] ETCI 2.0 will back funds that invest up to €200 million in companies[21]	Geographical concentration in large Western Europe countries for ETCI 1.0. ETCI 2.0 aims to become pan-European Sectorial concentration on digital technology, particularly SaaS/ enterprise software. Not targeting specifically, the deep tech large-scale manufacturing sector ETCI 1.0 Supported the creation of 15 mega-funds (>€1 billion). Participated in the growth of 12 unicorns[22] Six of the unicorns are in the Enterprise Software / SaaS sector; two in AI; two in HR Of the 45 companies invested, there are 12 in France, six in Germany and six in the Netherlands. ETCI 2.0 Aims to expand it, opening the initiative to mid-sized funds (€300 million+), aiming to reach 100 between mid-sized and mega-funds[23]	No direct link or tech transfer mandate	Helps create an ecosystem of scale-up VC/PE investors The most largely supported category of unicorns is Saas/ enterprise software, which might help create platforms that could have a catalytic role for other startups; a potential role suggested in the paper for SAP Might invest in Scale-Up Europe Fund, helping capital concentration

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21 https://sifted.eu/articles/eif-launches-e15bn-fund-of-funds
22 Ibid.
23 "European tech champions initiative". ETCI.

Program (+ brief description)	Focus on scale-up/late stage	Patient capital	Scale	Funds mobilised	Type of finance	Ticket size (if equity)	Sectorial and geographical concentration	Link with university and research organisations	Ecosystem creation capacity/ interlinkages with other initiatives
European Competitiveness Fund Mixed, coordination, de-risking platform The proposal aims to simplify a complex and overlapping group of 14 programs, by introducing a single rulebook, and a single portal for accessing information and opportunities In the Commission's proposal, it would be managed by the Commission, with an advisory body composed of stakeholders. Governments would be able to influence work programmes through comitology	Partially, aims to target the whole "investment journey", from research to industrial deployment	Partially patient, growth capital, for the part relying on InvestEU blended finance and guarantees For the previous InvestEU program, the contractual duration of the Limited Partnership In VC/private equity funds is generally 10-12 years[24]	Large, with important caveats Total size of €234 billion (excluding Horizon Europe). ECF will probably be reduced by at least 10-15% as an outcome of negotiations There is no clear allocation between the different type of finance in the Commission's proposal Minimum amount of ECF resources to be delivered through InvestEU is €17 billion. Maximum amount of budgetary guarantee to be €70 billion, with a 50% provisioning rate[25] The previous InvestEU, with an EU guarantee of €29 million, with a 40% provisioning rate, moved €427 million[26] EIB mid-term evaluation describes high levels of additionality of investments[27]	~14.7× (for the previous InvestEU program)	A set of instruments: Grants, loans, equity, quasi-equity, guarantees, procurement There is no clear allocation across different types of finance yet in the proposal	It varies The average ticket size for the current InvestEU (as of the end of 2025), when looking at its investments in commitments in financial intermediaries, mainly, but not only VCs, is €28 million, with a range from €1 million to €150 million (author's calculation)[28]	Risk of dispersion of funds across many technologies and industries The level of geographical concentration will depend on the outcome of political negotiations. According to the proposal, allocation should be merit/excellence based, with some targeted actions going in the direction of increasing the geographical spread of funds When it comes to the sectorial concentration: four policy windows, each with an allocated budget (with 20% of annual flexibility margin): resilience and security, defence industry & space, €125.2 billion; digital leadership, €51.5 billion; clean transition & industrial decarbonisation, €26.2 billion; health & biotech, agriculture & bioeconomy, €20.4 billion Each policy window has many different targeted sectors and technologies. This will probably result in a dispersion of funding that won't allow the necessary level of concentration	Albeit many details are missing, the proposal introduces a possible link between university research and commercialisation In the Commission's proposal, the Pillar II of Horizon Europe (€75 billion) – the one dedicated to collaborative research, involving universities, research organisations and companies – would be included under ECF work programmes This would imply jointly controlling ECF and Horizon Pillar II, with the objective to bridge the gap between basic research and commercial deployment	The ECF proposal, albeit many details are still missing, seems to go in the direction of providing more coordination to various EU industrial policy tools The ECF proposal includes advisory services for beneficiaries It also aims to establish an EU business network Dedicated actions for SMEs Actions in support of skill developments The ECF fund should act in coordination with the Connecting Europe facility, another part of the MFF that invests in cross-border energetic and mobility infrastructure. This would address more the framework conditions (e.g., cost of energy) for growth

24 "Annual report 2024". European Investment Fund.
25 "Proposal for a regulation of the European Parliament and of the Council on establishing the European Competitiveness Fund ('ECF'), including the specific programme for defence research and innovation activities, repealing Regulations (EU) 2021/522, (EU) 2021/694, (EU) 2021/697, (EU) 2021/783, repealing provisions of Regulations (EU) 2021/696, (EU) 2023/588, and amending Regulation (EU) [EDIP]". COM(2025) 555 final. European Commission, 16 July 2025.
26 "InvestEU map and indicators". European Union.
27 "EIB Group contribution to INVESTEU 2021-mid 2025: An independent evaluation". European Investment Bank, March 2026.
28 "InvestEU - portfolio equity: List of financial intermediaries as of 31/12/2025". EIF.

Program (+ brief description)	Focus on scale-up/late stage	Patient capital	Scale	Funds mobilised	Type of finance	Ticket size (if equity)	Sectorial and geographical concentration	Link with university and research organisations	Ecosystem creation capacity/ interlinkages with other initiatives
"Thematic platforms" with stakeholders also to be consulted in the developments of work programs InvestEU would be managed by the EIB/ EIF, with an advisory body with implementing partners (NDBs) and governments A possible strong role of industrial stakeholders in the governance of the ECF might increase incumbency risks On the other hand, the Council of the EU's negotiating position foresees a stronger role for governments in the governance of the ECF. These risks favour the allocation of funds that follows a negotiation between different member states, each one favouring its incumbents and priorities, rather than a strategic allocation								This is a top-down approach from industrial policy to collaborative research Critics of this choice say that this would result in a loss of autonomy for research, which needs other timelines and ingenuity in its choices At the same time, this would apply only to collaborative research, while other pillars of Horizon would remain free	Top-ups for IPCEIs, which would allow funds to be concentrated on strategic projects Value-chains scale up calls to integrate suppliers, manufacturers and innovators from different member states and diversify sources of supply The ECF aims to build on the experience of EDP and EDIRPA to integrate procurement as an industrial policy tool A "competitiveness seal", based on the model of the STEP seal, would also allow funding to be concentrated from other programs of the EU budget, on strategic projects
The ECF also aims to introduce the following: - Accelerated and targeted actions for imperative public interest and critical time-sensitivity. - Production ramp-up actions: introduce the possibility of financial contribution addressing actions that started prior to the date of submission of the proposal, if necessary. - EU tech frontrunners introduce bottom-up award procedures for industry consortia, involving large companies and startups. - An "industrial decarbonisation bank is expected to be placed under the governance of the ECF and based on funds stemming from the Innovation Fund (which uses revenues derived from auctioning ETS allowances), "additional ETS revenues and a revision of InvestEU". A pilot worth €1 billion was announced ahead of the proposal.									

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To bolster its industrial base and sustain quality employment, the European Union should build an integrated system for scaling and commercialising industrial innovation, rather than merely funding more start-ups. China, its principal industrial competitor, offers useful policy lessons, many of which are not intrinsic to its political system.

First, the EU should greatly expand patient public equity for capital-intensive firms, enabling EU, national and regional financing vehicles to make large initial investments and provide repeated follow-on funding that can transform start-ups into industrial hyperscalers.

Second, Europe's fragmented instruments should be coordinated around common sectoral priorities, investment criteria and value-chain strategies. Because European public risk capital is more limited than China's, it should be concentrated in technologies where Europe can retain leadership or leapfrog competitors.

Third, the EU should augment its capacity for coordinating such efforts, with a focus on universities and member states. Universities that should be linked systematically to public venture capital, industrial partners and procurement so that promising research becomes scalable faster; similarly, member states should mobilise their promotional banks and state-owned enterprises as anchor investors in strategic funds.

The objective is a continuous financing architecture capable of turning the European inventions and state-up pipelines into Europe's next generation of global industrial hyperscalers.

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