

Investment case

Biopharma R&D: The evolving formula for discovery and development

Innovation after innovation is advancing the biopharmaceutical industry, enabling better treatment of complex diseases. The industry has historically made its home in Europe and the United States, but that's changing.

by Gaurav Agrawal, Fangning Zhang, Anna Kortis, and Olivier Bus



GLP-1 therapies have triggered a boom in biopharma, the shorthand name for the slice of the pharmaceuticals business producing innovative therapies based on cells and biological processes to address complex diseases. Europe and the United States have long dominated the industry thanks to deep innovation ecosystems based on scientific discoveries, venture capital, clinical development and commercialization. In recent years, China has become a major source of pipeline assets, licensing activity, and early clinical momentum. By 2025, China accounted for about 30 percent of the global biopharma pipeline, up from 2 percent just ten years earlier, and about one-fifth of global licensing deals, according to McKinsey research. This momentum suggests China has developed capabilities that could reshape what is sometimes referred to as the ‘ten-year, 10 percent success rate’ model¹, establishing a new competitive frontier in biopharma increasingly defined as much by the productivity of the R&D system as by the originality of science itself.

This investment case is one of ten that are the foundation of the McKinsey Global Institute's report, *Catalyzing competitiveness: Where investment happens and why*. The report examines how investment propels competitiveness, and vice versa by analyzing the variation in costs across industries in regions around the world.

Creating value in biopharma R&D depends on how productively companies move assets through discovery and development

Biopharma R&D translates scientific hypotheses into therapeutic assets. The process typically moves through target identification, hit or lead generation, candidate selection, preclinical and studies that can lead to investigational new drugs, development through Phases I to III of clinical trials, regulatory review, and launch.² At each stage, companies invest to reduce technical, clinical, and regulatory uncertainty before committing larger amounts of capital in the next stage.

The biopharma industry is defined by long development timelines, uncertainty, and large up-front investment before commercial success. These dynamics are driven by the need to rigorously prove that therapies are safe and effective, obtain regulatory approval, and ensure reimbursement from health insurers or government health systems. Returns depend on successful therapies earning back not only their own costs but also the cost of failed therapies, typically over a limited period of patent and regulatory exclusivity. Economics are shaped by scientific success and by how quickly and efficiently companies move assets through key milestones, end weak programs, and concentrate resources behind the most promising opportunities.

Different R&D models exist. “Innovators” pursue first-in-class biology or new mechanisms and compete primarily on scientific differentiation. “Fast followers” become active once a target or mechanism has been clinically validated by others and so compete more on speed, development execution, and product profile. The fast follower model has a higher success rate because it follows a proven pathway. However, because fast followers enter the pathway later, their effective exclusivity is often shorter, making efficient development especially important.

Biopharma also relies on ecosystems. Most companies do not execute every step themselves. They retain control of the therapy they've developed, its IP, program leadership, and key capital-allocation decisions but outsource discovery support, preclinical work, trial operations, data management. Smaller biopharma companies may rely heavily on external partners,

while larger companies typically use them more selectively. Competitive advantage therefore depends not only on internal scientific capability but also on how effectively companies orchestrate external partners.

The United States and Europe remain major biopharma hubs, but China has quickly expanded its role in global innovation

Global biopharma R&D is concentrated in a relatively small number of hubs. Clusters matter in this industry because innovation tends to concentrate in places with a tight web of top academic science, venture funding, experienced talent, clinical networks, specialist service providers, and large pharmaceutical partners.

The United States has the deepest biopharma ecosystems centered on Boston, the San Francisco Bay Area, and San Diego, which are home to original science, biotech formation, translational research, and access to capital.

The biopharma industry is more fragmented in Europe, although the continent has several important hubs including the Golden Triangle in the United Kingdom, Basel, Belgium, and parts of Germany. These clusters combine strong academic research, established pharmaceutical companies, specialist biotech ecosystems, and development capability.

China's hub system has developed quickly over the past decade. Its biopharma companies, anchored in hubs in Beijing, Shanghai, and Suzhou, today account for about 30 percent of the global innovation pipeline.¹ That growth reflects stronger science as well as the build-out of much more complete innovation ecosystems spanning talent, capacity in contract research organizations (CROs) and contract development and manufacturing organizations (CDMOs), clinical sites, and development infrastructure.

Biopharma also becomes more global as therapies move through development. Discovery and early development are concentrated in a few hubs, but later-stage trials increasingly require approval in multiple markets. Even so, local ecosystem strength continues to shape where biopharma assets are created, how quickly they move, and where competitive advantage accumulates.

Faster development and stronger ecosystem economics materially lower biopharma R&D costs

This analysis examines the economics of biopharma R&D through the lens of levelized cost per drug developed. It compares a Chinese biopharma business and a global one, examining the difference in the cost of bringing a similar drug through discovery and development. The company is a fast-follower developing a drug using monoclonal antibodies, which are lab-made proteins designed to recognize and bind to a single specific target in the body, usually a protein on a cell surface or circulating in the blood. The company operates a full prelaunch R&D pathway spanning discovery and development. A Chinese biopharma company serves as the base case, reflecting best-in-class performance.

The case models both the discovery and development phases. Discovery encompasses all the scientific work needed to identify a target, design and optimize a lead molecule, test it in preclinical settings, and assemble the evidence required to begin human studies. Development is the clinical-trial part of biopharma R&D, spanning Phase I, Phase II, and Phase III clinical studies and the regulatory review needed for approval. The model is risk-weighted, meaning it accounts for the average success rates of a drug progressing to the next stage. Success rates are assumed to be identical for Chinese and global companies.

Both companies are assumed to be developing a drug for global launch. The Chinese player is assumed to conduct the discovery phases entirely in China. In development, Phase 1 is conducted entirely in China, Phase 2 is split 30 percent in China and 70 percent globally, and Phase 3 is conducted entirely globally to support a global launch. In contrast, the global company is assumed to have a primarily US and EU footprint and to run fully global trials. We assume a fixed commercial window due to patents and competition. Development speed affects economics in two ways. A slower development path increases R&D costs and brings launch closer to the end of the commercial window, leaving fewer years of sales over which those costs can be recovered. In the base case, annual demand is held constant, so the commercial impact of slower development is captured in fewer years of sales remaining.

The analysis isolates R&D economics only. It excludes downstream commercial infrastructure, large-scale manufacturing build-out, and other costs outside the development process, while holding demand-side assumptions constant across comparisons. Differences between the Chinese base case and similar businesses in different locations are captured through labor economics, development timelines, external ecosystems, overhead and material inputs.

China has achieved a meaningful increase in speed and reduced levelized cost of biopharma R&D

In China, the R&D timeline spans roughly 36 months of discovery work through an investigative new drug study followed by 87 months of development, implying a total time to launch of about 123 months, or just over ten years.

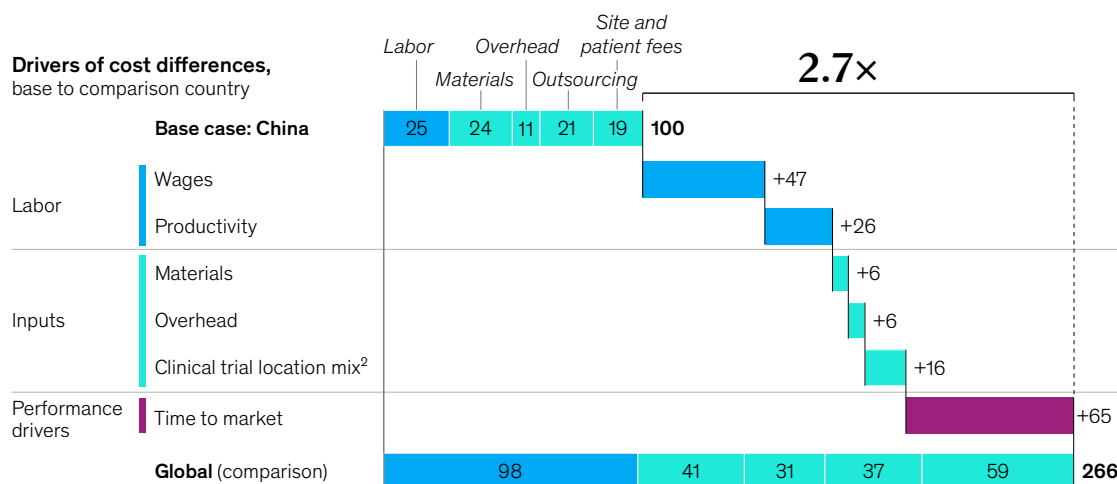
Internal labor in the base case accounts for about 25 percent of the total levelized cost, which is spent on internal scientific, clinical, regulatory, and program-management teams that lead target assessment, molecule selection, translational planning, clinical oversight, and key decisions that stay in-house. Materials such as reflecting assays, study consumables, preclinical and clinical inputs, and other nonlabor items that move a therapy forward contribute roughly 25 percent of the levelized cost. Outsourcing adds another 20 percent and includes the use of CROs and other external partners for activities such as assays, toxicology, work that enables investigative new drug studies, site start-up, monitoring, data management, and day-to-day study operations. Site and patient fees account for 20 percent, highlighting the importance of clinical execution at the site level, and overhead such as broad infrastructure, logistics, coordination and other program support contributes about 10 percent (see sidebar, Methodology).

The China base case overall illustrates the costs associated with an ecosystem-driven R&D model. Internal teams are important, but most of costs are incurred beyond in-house staffing, linked instead to materials, external partners, site activity, and supporting infrastructure.

Exhibit

Time to market accounts for most of the cost difference in biopharmaceutical R&D.

Levelized cost of discovery and development R&D¹, indexed to 100 for base case, before taxes and direct subsidies



¹We are considering a fast-follower strategy for developing a monoclonal antibody therapy.

²Includes site fees, patient fees, and outsourcing costs that depend on a chosen geography for the trials (applicable to Phase I and partially to Phase II only). Source: McKinsey Global Institute analysis

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Sidebar

Methodology

This investment case compares the costs of a biopharmaceutical R&D project across various geographies to understand what makes some regions more cost-competitive than others. Our levelized cost methodology converts a project's full life cycle economics into a single unit cost. It can be interpreted as the unit price that would make a project's net present value equal to zero over its entire life cycle, which is the minimum price that makes that project viable and is

in line with the macroeconomic concept of long-run marginal costs. The levelized cost concept is commonly applied in the energy sector, where it is known as the levelized cost of energy. We do not consider taxes, subsidies, and externalities, which vary and are hard to pin down.

The calculations are informed by McKinsey's work in the life sciences industry, which provides our understanding of the capital expenditure,

labor, energy, materials, and other inputs, as well as time, typically needed to build and operate a biopharmaceutical R&D project. We price the inputs at the typical costs in a geography, drawing on proprietary databases maintained by MGI's Economics Research team, and at the typical weighted average costs of capital, drawing on McKinsey's Value Intelligence platform, a curated database of the financials of companies globally.

China's performance is driven by faster execution, lower wages, and higher productivity

Developing a successful biopharma therapy costs a multinational company about 2.7 times more compared to a Chinese company on a levelized cost basis, reflecting both higher development costs and a reduced commercial window from a longer time to market. Differences in speed, labor economics, R&D productivity, and clinical trial locations account for most of this gap.

Time to market is the top driver of China's advantage, accounting for roughly 40 percent of the cost difference. Discovery takes about 36 months in China versus 54 months globally, while development takes about 87 months compared to 100 months. China accomplishes this speed through a combination of factors explored in detail below, some of which could be replicated elsewhere. If global companies were to leverage China's speed, they would be able to launch as much as 2.5 years earlier, extending the therapy life cycle and total commercial value of the asset.

Wages account for about 25 percent of the gap. Salary levels in the discovery part of the business are roughly 50 percent lower in China across the talent pyramid. Such a difference is significant even for the fast-follower archetype, because target assessment, molecule optimization, translational planning, and program leadership still require substantial internal scientific effort.

Productivity contributes 15 percent to the gap that separates China from Europe and the United States. Chinese companies employ an operating model that incorporates a fast-to-signal approach, which uses leaner data packages and parallel processing of research steps. Workers in China's biopharma labs work longer hours than their counterparts in Europe and the United States, meaning that similar-sized teams can move faster through the discovery phase in particular.

Clinical trial location accounts for about 10 percent of the gap. Running trials is materially cheaper in China where the cost per patient in a Phase I clinical trial is about one-third of the global benchmark. Site fees, patient recruitment, monitoring, local salaries and broader study operations all contribute to that difference. Patient enrollment is two to five times faster in China, driven by an abundant patient pool with high unmet medical needs, a large population unfamiliar with treatment opportunities, and patients often highly concentrated in leading hospitals.¹ Additionally, salaries in CROs and CDMOs in China are about 62 percent lower than global benchmarks, further contributing to the lower cost of running trials in China. These clinical trial advantages are bigger in early stages because later phases are increasingly global in order to secure regulatory approval for a global launch. Because programs can fail at every phase, accounting for success rates means the economics of the earlier phases matter more than costs alone would suggest.

Overhead, materials, and country risk account for the rest of the gap, contributing 1 to 3 percent each. Overhead is a relatively small contributor, and prices for input materials are also relatively consistent across geographies. The assumed weighted average cost of capital in China is slightly higher than for a global company but not enough to have a material impact on the levelized cost.

In summary, China's leveled cost advantage is explained by a combination of faster time to market, lower wages, higher productivity, lower trial costs, and a more cost-efficient external ecosystem. The difference is not the result of any one advantage but of several reinforcing ones spanning the R&D pathway. China's advantage is strongest in discovery and Phase 1, which are the most repeated stages on a biopharma pathway and the stages with the highest attrition, giving them more weight in the process. Lower cost and faster progression at those stages allow more programs to advance, increasing the number of "shots on goal" and the likelihood of success.

Delivery-focused ways of working, scaled infrastructure, and a supportive operating environment provide advantages

China's speed and cost advantage in biopharma R&D is related to six reinforcing factors that allow companies there to move 1.5 times faster from target identification to the start of clinical trials and enroll patients two to five times faster compared to the global benchmark.

The first factor is regulatory reform. China has steadily shortened clinical timelines and made the path from discovery into development more predictable through reforms. Recent measures include support for investigator-led trials, faster review of clinical trial applications, 30-day clinical trial review, and new rules for clinical research and the translation of biomedical technologies. These changes reduce friction early in development and help programs move toward patient trials more quickly.

China also has a large patient pool with high unmet need, often concentrated in large leading hospitals. It also has more than 1,500 clinical sites, more than one-fifth of which can conduct Phase 1 trials. Integrated capabilities such as imaging and biomarker testing support efficient trial execution, and the scale and concentration of the site network accelerate patient enrollment and reduce friction once a trial program starts.

Third, China has a deep and scaled network of specialist service providers that provides a one-stop-shopping model for research, development, and manufacturing. These CRO and CDMO ecosystems are more of a plug-and-play environment, where full-time employees are readily available and proximity enables fast collaboration.

In discovery, Chinese companies increasingly use a fast-to-signal approach that relies on leaner data packages, a focus on the critical path, parallel processing of early work, and iterative experimentation to generate signals quickly and derisk decisions. Senior leaders stay close to the work, resolving bottlenecks quickly and pushing programs forward with speed and discipline.

China's funding environment is a fifth factor. For pre-revenue companies, China has moved from a limited venture-capital market lacking an IPO pathway to a much broader financing base that includes venture capital, public markets, government funding, out-licensing, and commercialization. The diversity of funding mechanisms allows companies to tap different sources at different stages, giving them more flexibility to sustain innovation and push products forward. It also gives them options when private funding tightens.

Finally, China is expected to supply more than one-third of STEM graduates across the G20 by 2030, up from 29 percent in 2020. This depth of talent supports scientific capability and operational execution.

Businesses and policymakers face a choice in how to leverage China and what lessons to take from its model

This analysis indicates that biopharma R&D economics are not driven by wages alone. A large part of what distinguishes the industry in China comes from execution, its ability to compress timelines, use external partners effectively, and move programs through discovery and development with less friction. Speed matters twice—first by reducing cost and second by preserving more of a remaining commercial window.

For multinational pharmaceutical companies, the strategic question is how to leverage China. For some companies, the right choice will be selective participation in China through partnering, licensing, or local development. For others, China may become a true global R&D hub. And for others still, the main value may be in learning from China and adapting its speed, externalization model, and execution discipline elsewhere.

The degree of participation in China depends on how companies view a set of real risks. How durable is intellectual property protection, and how much value can be protected over time? How representative are clinical data generated in China when applied to broader global populations? How will European and US authorities respond to deeper China exposure as concerns around sovereignty, supply resilience, and public procurement increase? And how should companies think about the risk that a China-based competitor may access similar targets, move faster, and reach the market first?

For companies looking to learn from China, the opportunity is to borrow specific elements of the model and apply them in a global setting. The open question is how far this can go in practice. How do companies move faster without cutting corners? And how much of China's speed advantage can be translated into a multinational operating model, where governance, compliance, and incentives may be different?

How can governments support their biotech industries? Financial incentives matter, but they are not enough on their own. Promoting speed, scale, collaboration, and translating trials and tests into quick patient impact while maintaining patient safety are also critical.

Faster, clearer, and more predictable review processes reduce friction when development starts. Improving clinical-trial infrastructure, including site readiness, diagnostics, biomarker capability, and workforce training, can increase efficiency. More predictable demand, faster approvals, and clearer quality standards can help CROs, CDMOs, and clinical-site partners expand capacity, and stronger universities, training programs, and career pathways can increase scientific, operational, and clinical-development expertise. Stronger links between academia, hospitals, and industry can move promising science more quickly into development programs, clinical studies, and patient use.

China is not simply a lower-cost development base, it has a different model for building speed, capacity, and translation. For investors and CEOs, the question is how to leverage China's strengths selectively and learn from its operating model. For policymakers, the task is to create an ecosystem in which talent, trial infrastructure, specialist service providers, and regulation reinforce one another and allow companies to move quickly. The systems that move from promising science to patients faster will capture more value, attract more investment, help more patients sooner, and shape the next wave of innovation.

Gaurav Agrawal is a McKinsey senior partner based in the New York office, **Fangning Zhang** is a McKinsey partner based in Shanghai, **Anna Kortis** is a McKinsey partner based in the Vienna office, and **Olivier Bus** is a consultant based in the Amsterdam office.

Endnotes

¹ Alexander Schuhmacher et al., "Benchmarking R&D success rates of leading pharmaceutical companies: an empirical analysis of FDA approvals (2006–2022)" Drug Discovery Today, February 2025, Volume 30, Number 2.

² An investigational new drug study is used to support an application that pharmaceutical businesses must submit in the course of preparing a potential new drug for human clinical studies.

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