From Free Rider to Innovator: How China Became a Global Pharmaceutical Powerhouse

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A Global Hierarchy Under Pressure

A long-standing consensus in health economics holds that smaller or lower-income countries are better off as "free riders" — importing innovative medicines developed in wealthy nations rather than investing in costly, uncertain domestic R&D (Olson and Zeckhauser 1966; Kyle 2007; Lakdawalla 2018). The logic is compelling: pharmaceutical R&D requires enormous fixed costs, only about 10% of drug projects ever reach approval, and catching up to the global technological frontier seems out of reach for late-mover economies.

This logic, while sound in theory, is increasingly difficult to square with recent developments in China. A decade ago, China barely registered in global pharmaceutical innovation. Today, it is a serious contender at the frontier. Understanding how this happened, and what policies drove it, has become one of the most consequential questions in the economics of innovation.

The policy stakes are high beyond China's borders. Governments worldwide are grappling with a fundamental tension identified by Garthwaite (2025): how to keep medicines affordable for patients while maintaining the profit incentives that drive firms to develop tomorrow's cures. As shown by Dubois (2025), national pricing and reimbursement decisions reverberate globally because pharmaceutical innovation is a public good — a price cut in one major market alters incentives for the entire world. China's experience offers a rare natural experiment in resolving this tension between affordability and innovation incentives through insurance policy design.

China's Remarkable Ascent

Our research (Barwick, Xia, and Xia 2026) documents a striking structural break in China's pharmaceutical innovation trajectory. In 2010, China accounted for fewer than 8% of global clinical trials. By 2020, it had surpassed both the United States and Europe in annual registered trial volume. By 2024, China was initiating more than 5,000 clinical trials a year — a more than five-fold increase from its 2010 baseline.

Crucially, this is not a story of low-quality, imitative research scaling up. Using three independent measures of scientific novelty — a mechanism-based novelty index adapted from Dranove, Garthwaite, and Hermosilla (2022), a GPT-based classification of trial objectives, and an analysis based on Phase III trial control arms — we find that China's high-novelty trials grew by 49% to 123% relative to the US benchmark over the same period. The surge is led overwhelmingly by domestic Chinese firms, which account for 88% of the post-2015 increase in private-sector trials, while multinational pipelines remained relatively flat.

The expansion also extends well beyond trial initiation. Out-licensing transactions to multinational corporations doubled. First-in-world regulatory approvals for China-originated drugs rose by 36%. New firm entry into clinical development increased by 27%. According to an industry report (IQVIA 2024), China has now overtaken EU4+UK in total new drug approvals over the past five years, trailing only the United States.

Figure 1: Time Trend - Trial Quantity and Novelty

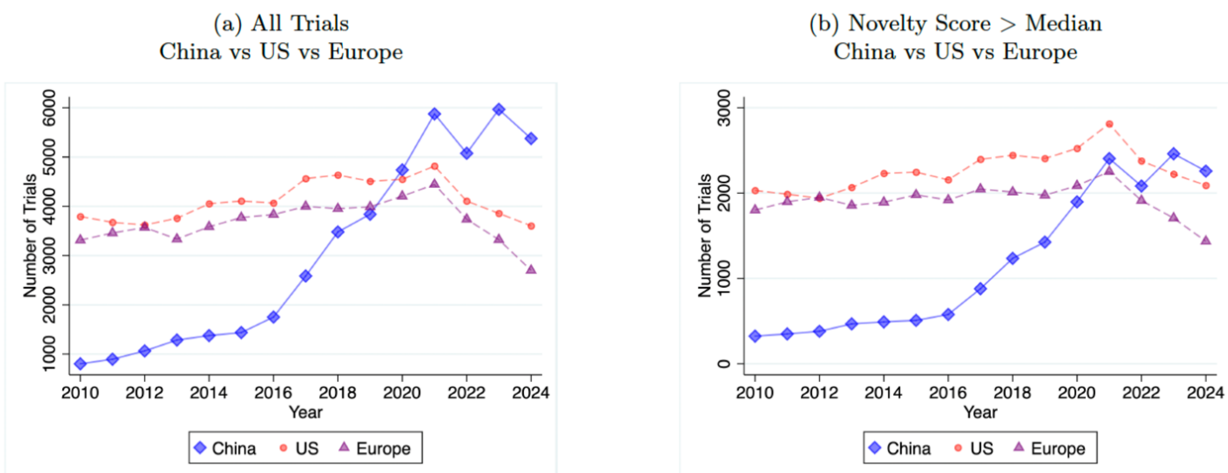

Figure 1: Annual clinical trials in China, the US, and Europe, 2010–2024. Left panel shows all trials; right panel shows high-novelty trials (above-median novelty score) using the novelty index in Dranove, Garthwaite, and Hermosilla (2022). Source: Barwick, Xia, and Xia (2026), based on Citeline TrialTrove Database.

What Drove the Transformation?

A structural break test confirms that China's divergence from the US clinical trial trajectory began sharply in 2016–2017, with a flat pre-trend in the preceding years. This timing points squarely to a single policy event: the 2016 National Reimbursement Drug List (NRDL) reform.

Before the reform, China's national public insurance program — the world's largest, covering more than 95% of the population — prioritized low-cost generic drugs. Innovative, high-priced therapies were largely excluded, forcing patients to pay full out-of-pocket costs. This meant that despite China's enormous population, the effective market for innovative drugs was severely constrained.

The NRDL reform, launched in 2016 by the National Healthcare Security Administration, fundamentally changed this. The government leveraged its monopsony power to negotiate steep price cuts — averaging 50–60% — in exchange for guaranteed coverage and near-universal patient access. By 2024, the program had included 699 drugs, and annual government spending on negotiated innovative drugs exceeded ¥100 billion ($14 billion), larger than the entire innovative drug market of ¥66 billion ($ 10 billion) in 2015.

On net, this trade-off strongly favored pharmaceutical firms. The quantity of drugs sold increased by 350% on average following NRDL inclusion; for cancer drugs specifically, volumes nearly increased tenfold. Despite the price cuts, revenues, or the effective market size, rose by an average of 100% — and by 500% for oncology drugs.

Identifying the Causal Driver

Figure 2: Mechanism - Effect of NRDL across Disease Categories

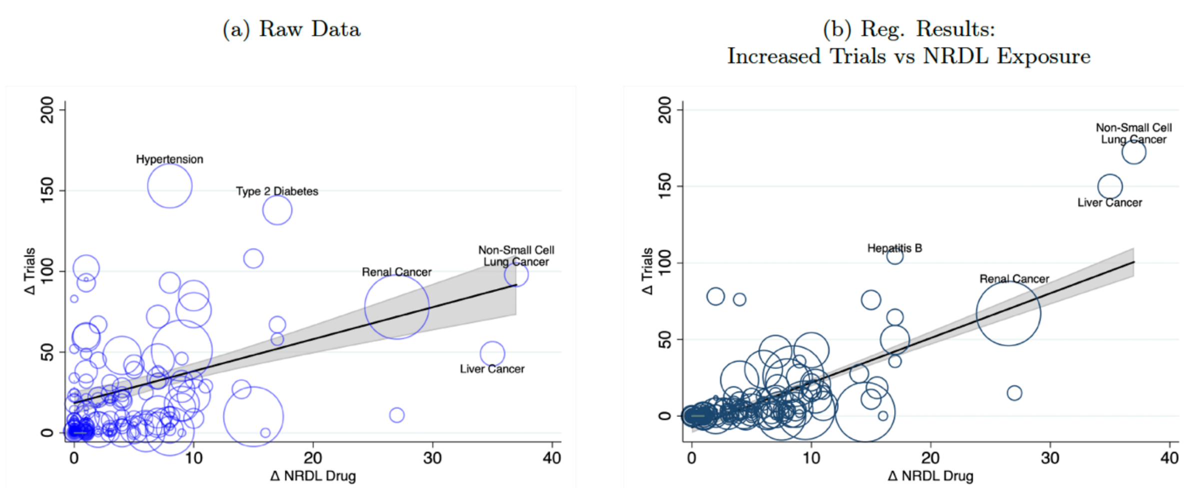

Figure 2: This figure plots, for each disease category, the change in clinical trial activity against the change in the number of NRDL-included drugs between 2016 and 2024. Panel (a) displays the raw data. Panel (b) presents the estimated increase in trials associated with NRDL exposure (measured as the number of NRDL-included drugs) for each disease category. Circle size is proportional to the total number of drugs in the category. Data source: Citeline TrialTrove Database.

To causally identify the NRDL's role, we exploit variation in the reform's intensity across 332 disease categories. There is considerable heterogeneity in the scale of NRDL expansion across disease categories, which allows for a more granular examination of how shifts in market size influence the direction of R&D. Figure 2 visualizes this relationship by plotting the change in clinical trial activity against the expansion of NRDL coverage (the number of drugs included in NRDL) for each disease category between 2016 and 2024. Panel (a) displays the raw data, while Panel (b) plots the estimated increase in trials attributable to NRDL exposure. The disease categories with the most pronounced expansion in NRDL exposure include non–small cell lung cancer, liver cancer, and renal cancer, diseases that also witnessed some of the sharpest increases in trial volume. There is a strong positive association between reimbursement expansion and R&D response.

A placebo test using disease categories that received no NRDL expansion shows no increase in trial activity after 2015 — a sharp contrast that strongly implicates the reform as the main driver rather than broad national trends.

We also systematically evaluate competing explanations. Could the boom have been driven by the accumulation of scientific knowledge and the return of US-trained Chinese talent? Publication volumes and returnee scientists both grew steadily, but gradually and without any structural break around 2016. They lack the discontinuity needed to explain the sudden acceleration. Could it be regulatory streamlining? The 2015 clinical trial application reform reduced IND approval backlogs substantially, contributing an estimated 8% boost in trial counts — important, but far from sufficient to explain the full picture. Could industrial policy deserve the credit? Firms headquartered outside "Made in China 2025" pilot cities show trial growth just as large as those inside them.

Our decomposition exercise quantifies these contributions directly. For oncology — the largest therapeutic area — the NRDL reform accounts for 43% of the observed surge in trial activity between 2016 and 2024. Knowledge accumulation and talent inflows together explain 24%. Other policies contribute less than 1%. The NRDL was the dominant catalyst.

Static Access vs. Dynamic Innovation: Which Matters More?

A common concern about demand-side health policies is that they may expand access to existing drugs while doing little to stimulate truly novel innovation (Dranove, Garthwaite, and Hermosilla 2022). The NRDL appears to be a notable exception: the trials it induces are concentrated in high-novelty, first- or best-in-class compounds, consistent with the reform's explicit inclusion criteria that reward unmet clinical needs and therapeutic originality.

This has profound implications for welfare analysis. The NRDL generates two types of gains: static gains from expanding patient access to existing innovative drugs, and dynamic gains from stimulating the development of the next generation of therapies. Our back-of-the-envelope calculation, focused on oncology, finds that the dynamic gains from induced innovation are conservatively estimated at three times the static gains. Expanding access to drugs that already exist is valuable; catalyzing the discovery of drugs that would not otherwise exist is far more so.

Specifically, we estimate that the NRDL induced approximately 60 additional oncology drugs to be developed over the long run. Using realized welfare estimates for comparable cancer drugs as a benchmark, the dynamic consumer surplus gain is approximately ¥68 billion per year, roughly three times the static gains (¥22.5 billion) from improved affordability (Barwick, Swanson, and Xia 2025).

Lessons for Policy

China's pharmaceutical transformation carries several lessons for economists and policymakers beyond its borders.

First, market size matters enormously for innovation incentives, and governments can engineer effective market size through insurance policy. The NRDL is not a mere insurance subsidy; it is effectively a purchasing contract. By guaranteeing volume in exchange for price concessions, the policy offers rare evidence that a well-designed insurance policy can help reconcile the tension between affordability and innovation incentives, lowering out-of-pocket costs for hundreds of millions of patients while raising the expected returns to developing the next generation of therapies. This is consistent with the broader finding, documented by Costa Font et al. (2012), that health insurance coverage can stimulate R&D investment — though the design of the system matters greatly for whether the resulting innovation is novel or incremental.

Second, the design of the insurance policy shapes the direction of innovation, not just its scale. Because the NRDL explicitly rewards novelty and clinical effectiveness in its inclusion criteria, it directed R&D toward drugs with unmet needs rather than incremental "me-too" development. This stands in contrast to the findings of studies examining broader insurance expansions, which tend to find that demand-side shocks primarily pull incremental innovation. It also contrasts with the concern raised by Varol et al. (2011) that price regulation in lower-income markets typically delays or deters drug launches — the NRDL sidesteps this trap by pairing price concessions with insurance expansion.

Third, late-mover economies should not be assumed to be permanently consigned to importing yesterday's medicines. A (state-backed) demand expansion can substitute for decades of supply-side catch-up. China built a domestic innovation ecosystem not primarily by subsidizing R&D laboratories, but by creating a market large enough to make frontier R&D profitable.

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