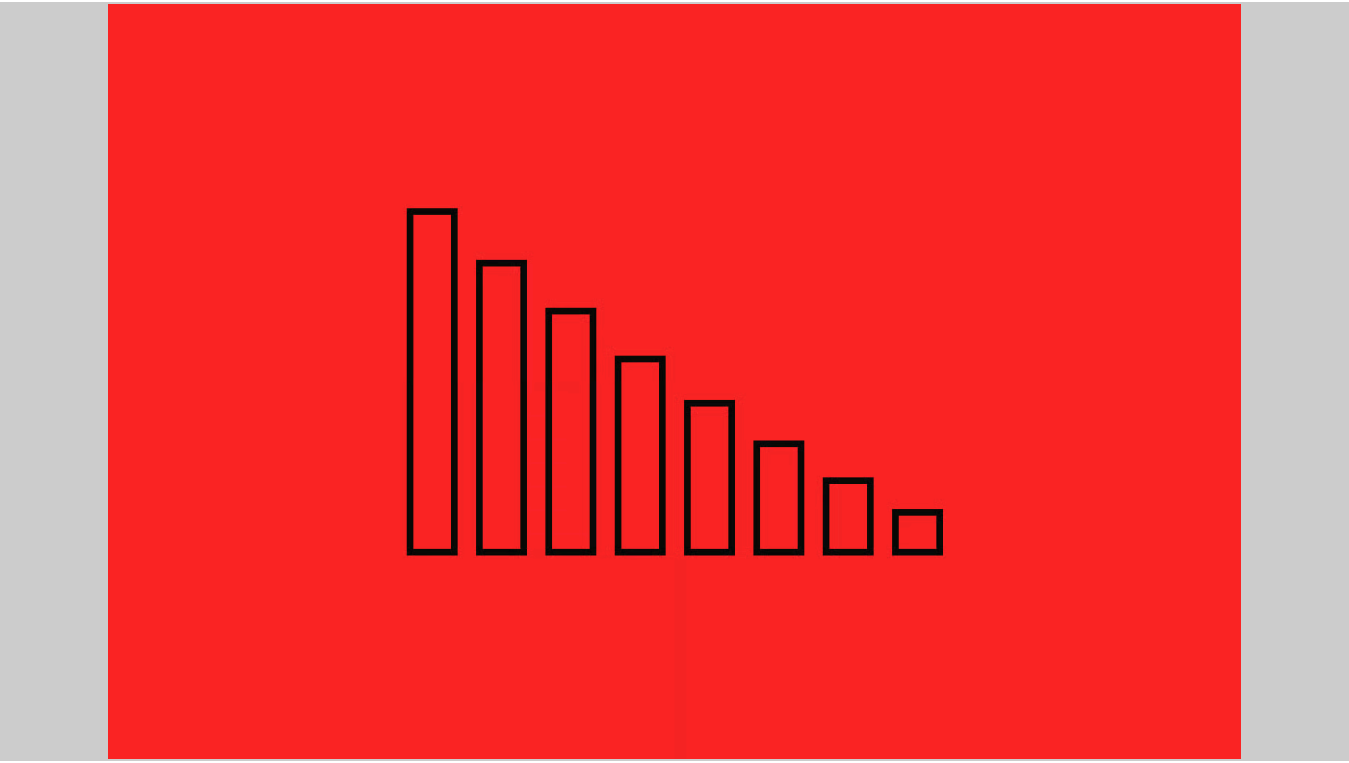
Industry

China's Involution Trap

Chinese manufacturers are trapped in destructive price wars that erode profits and undermine economic sustainability. What is driving involutionary competition in China's industrial economy, and what will it take to curb it?



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Involution (*neijuan* (内卷) in Chinese) refers to aggressive industrial competition characterized by shrinking margins, declining profitability, and diminishing economic returns. The term has roots in anthropology and was coined by anthropologist Alexander Goldenweisser who used it to describe cultural forms, such as Maori decorative art and Gothic architecture, that had become increasingly intricate and complex without undergoing fundamental transformations. The anthropologist Clifford Geertz later applied the concept of involution to agricultural production, using it to describe the process in which labor and output in wet-rice farming in Java, Indonesia increased while output per worker remained stagnant.

Geertz's work laid the groundwork for the modern study of involution, where the concept is applied to competition in industrial economies. In this context, involution refers to low-quality competition between industrial firms that combines increased effort with deteriorating collective returns. Price wars

are one of the most distinctive features of involutionary competition in industrial economies.[1] A price war occurs when manufacturers building physical goods, such as batteries, solar photovoltaics, and electric vehicles, slash prices in a tit-for-tat effort[2] to capture or defend market share. Price wars erode margins earned by manufacturers and reduce industry-wide profitability as firms sacrifice profits for market share. Over time, industrial competition becomes a war of attrition in which firms compete on their ability to sustain low-margin operations and withstand financial losses–rather than competing on product quality, brand value, technological innovation, and other positive dimensions.

Price wars are different from standard price competition, where low prices are often driven by improvements in production efficiency and technological innovation that enable the development of low-cost, high-quality products. In healthy industrial economies, occasional price competition can force companies to improve production efficiency and invest in research & development (R&D) that potentially enable the development of new products that offer superior quality and greater value at lower prices. By contrast, price declines in involutionary competition are (mostly) driven by manufacturers undercutting each other until prices of goods approach or fall below the cost of producing them. Additionally, price wars in industrial economies dominated by involutionary competition tend to occur more frequently and last longer than standard economic models of price competition, such as Edgeworth price cycles[3], would suggest.

The economics of involution

To grasp the problem with price wars, it helps to understand how prices are normally set under normal market conditions. In a healthy market, firms set prices in a way that maximizes their ability to generate profit, increase return on investment (ROI), and recoup total costs, including upfront costs[4], fixed operating and financing costs[5], and variable production costs[6]. This often requires setting the price of a product above the marginal cost of production, i.e., the variable cost of producing every additional unit[7], which increases the unit margin[8] and overall profit earned from manufacturing and selling a particular product. Pricing a product near the marginal cost of production decreases the unit margin and reduces profit to zero while pricing *below* marginal cost results in negative margins and creates losses.[9]

In standard industrial competition, the rational strategy for any manufacturer is to sell a product significantly higher than the marginal cost of producing it. All things equal, a manufacturer that consistently sells its product(s) near or below marginal cost will eventually have to adjust its pricing strategy before it is forced to restructure or exit the market through bankruptcy, shutdown, or acquisition. Thus the necessity of making profit forces firms to set reasonable prices for products and functions as a market self-correction mechanism: unprofitable and capital-inefficient firms are forced out of the market to make way for new entrants and free up labor and capital for productive firms. This way, even though price wars can occur in healthy markets, prices eventually reset back to normal levels once firms inevitably raise prices to increase profitability.

In industrial economies dominated by involutionary competition, manufacturers may fail to set prices that reflect costs, including fixed upfront and operating costs as well as variable production costs and financing expenses. This pricing strategy is often driven by the desire to capture market share, though it can also be driven by the pressure faced by manufacturers to recover monetary capital, cover ongoing expenditures, and clear unsold inventory to prevent obsolescence risk and reduce holding costs. Regardless of the motive, failing to price products at a level that reflects actual production costs and yield high margins violates the expectation that industrial firms align pricing strategy with business goals, such as generating profits and positive returns.

A particular distinction between standard competition and involutionary competition in certain industrial economies, such as China's is that declining profitability may not necessarily result in companies exiting the market. Companies that generate minimal profits or make losses are able to continue operations, suggesting the failure of market self-correction mechanisms that constrain loss-making among firms. One explanation is that manufacturers in "strategic industries", i.e., industries identified by the central government as being of utmost importance[10] are given preferential support by local governments implementing national industrial policies. Financial support from local governments can come in the form of access to low-interest loans, subsidies, and tax breaks, which reduce costs for manufacturers and may continue even when manufacturers are barely profitable or making substantial losses. This dynamic hinders the exit of loss-making firms and may encourage manufacturers to continue engaging in aggressive price competition and optimize for market share at the expense of profitability.

Access to cheap credit provided by local governments and state-owned banks may also lead to overproduction and overcapacity, which can exert downward pressure on prices and further intensify price wars. Overcapacity occurs when manufacturers expand production capacity beyond what is reasonable, given projected market demand, and may require making difficult tradeoffs. Manufacturers can either cut back on production, which increases losses since fixed operating expenses and financing costs have to be covered regardless of output volume, or they can keep producing. The latter can result in overproduction, as industrial output exceeds available demand, which depresses prices and may exacerbate price competition.

Overproduction triggers price wars when manufacturers accumulate unsold inventory and must choose between holding inventory or slashing prices to increase sales. The first choice may yield higher profits if market demand rises as expected and consumers are willing to buy at original prices set by manufacturers, but it also exposes manufacturers to greater obsolescence risk[11], increases holding costs[12], and impedes monetary recovery[13]. The second choice generates immediate revenue, which manufacturers can use to meet financial obligations and invest in new production, but it forces them to accept lower or negative margins and erodes profitability over time.[14] Overproduction can also be driven by productive commitments, such as when financial support from local governments comes with the requirement to maintain certain levels of employment and production activity, which make it difficult for manufacturers to adjust production to reflect demand.

Evidence of involution in China's industrial economy

The most evocative examples of involutionary competition among manufacturers in China come from the battery, solar panel, and electric vehicle manufacturing sectors. China dominates the production of lithium-ion batteries used in electric vehicles, battery energy storage systems (BESS), consumer electronics, electric aviation, and other products, accounting for 80% of global production in 2025. Average lithium-ion battery pack prices have fallen by 93% in real terms since 2010, reaching a record low of $108 per kilowatt-hour globally and $84 per kilowatt-hour in China in 2025, partly driven by overcapacity and intense price competition and among Chinese manufacturers.[15] This trend has continued in recent years, compressing margins across China's battery industry. In the first half of 2026, seven of eight publicly listed Chinese power-battery makers reported lower gross margins: Zhengli New Energy's margin fell by 5.4 percentage points and EVE Energy's by more than 3 points, while CATL, Gotion High-Tech, and Sunwoda also reported varying declines.

In a similar trend, involutionary competition in China's solar photovoltaic (PV) module industry have pushed down prices of solar PV modules, with global spot prices falling by 60% between 2022 and 2024 alone. China dominates solar PV module manufacturing, accounting for 84% of global production in 2024, and other parts of the solar supply chain, including cells, wafers, and polysilicon. Despite growing global demand, years of persistent overcapacity and price wars have eroded margins for Chinese solar manufacturers, with over 90% reporting losses in 2026 and more than 70 filing for bankruptcy since 2024. Meanwhile, efforts to curb involution in the sector have been largely ineffective: for example, as recently as October 2026, manufacturers were bidding for solar procurement contracts below the minimum cost floor of RMB 0.68 per watt ($0.10) established by the China Photovoltaic Industry Association.

Involutionary competition is also rife in China's electric vehicle industry, which produced over 70% of EVs sold globally in 2024 and has gone through multiple price-war cycles in recent years. In February 2024, market leader BYD reduced the price of its entry-level Qin Plus plug-in hybrid by 20% to roughly $11,000, prompting domestic rivals such as Geely, Changan, and SAIC-GM-Wuling to respond with price cuts of their own. BYD escalated the price war again in 2025 when it slashed prices across 22 electric and hybrid vehicles by up to 34%, forcing competitors, including Leapmotor and Geely, to defend market share by slashing prices on their own EVs. Those relentless price cuts have dramatically reduced profits across the industry: BYD's net profit fell 19% in 2025, its first annual decline in four years, while overall auto industry profits fell 23% year-on-year in the first nine months of 2026, and the sector's average profit margin declined to just 3.3%.

Involutionary price competition among Chinese manufacturers extends to other sectors, including consumer electronics, computers, polysilicon, petrochemicals, steel, and cement. Price wars in these industries have almost always been followed by shrinking profits for manufacturers and substantial financial losses. Although manufacturers would benefit from a collective agreement to avoid undercutting each other, coordination remains difficult. A game-theoretic analysis of the situation would frame it as an instance of the prisoner's dilemma: firms may collectively benefit from avoiding

destructive price wars, but each has an incentive to undercut competitors in order to capture market share.[16] Another way to understand the problem is through the lens of zero-sum games: adopting a low-pricing strategy may rational from an individual perspective, but widespread undercutting produces negative outcomes for everyone involved.

Who else is affected by involutionary competition?

Involutionary competition doesn't just affect the companies participating in it; consumers, workers, suppliers, households, financial institutions, governments, and other participants in the economy may be impacted as well. While consumers temporarily benefit from cheap products, price wars may in fact erode consumer welfare over time. When companies compete on price instead of product differentiation, consumers have fewer opportunities to choose between products that are meaningfully different in terms of quality, performance, reliability, features, and brand value. Furthermore, companies may allocate resources to defensive investments instead of making long-term investments that could lead to improvements in product quality, reliability, and features, or enable the development of entirely new products.

Suppliers are affected by involutionary competition when companies compensate for declining profitability by pressuring them to accept lower prices for production inputs, such as raw materials and parts used in manufacturing of physical products such as batteries, solar panels, and EVs. This can deprive suppliers of the capital they need to invest in new equipment, facility upgrades, ongoing R&D, and workforce expansion. Suppliers may also be forced to reduce worker compensation and reduce headcount to offset declining revenues and shrinking profit margins. For example, polysilicon manufacturers in China have been forced to accept lower prices for their products due to declining profitability and financial losses among wafer manufacturers. Similarly, Chinese EV manufacturers, such as BYD, have reportedly demanded price concessions from suppliers and delayed payments to upstream manufacturers such as steelmakers.

Workers are affected by involutionary competition when companies, as well as suppliers, reduce worker compensation to lower operating costs and improve cash flow amid declining profits and increased financial losses. In 2023, Reuters investigated the Chinese auto industry's price wars and reported on how manufacturers in the sector were cutting worker compensation by reducing bonuses and overtime pay; a worker at SAIC-Volkswagen told journalists that his monthly earnings had fallen to slightly more than one-third of what they were when he joined the company in 2016. The effect on workers can also show up in mass layoffs by struggling manufacturers: to illustrate, China's five largest solar manufacturers reduced their combined workforces by roughly 87,000 employees in 2024 and about 40,000 employees in 2025. Given that solar panel prices have been falling for years, driven in part by relentless price cuts, these massive reductions were likely inevitable from the start.

Financial institutions are affected by involutionary competition when the manufacturers they lend money to engage in aggressive pricing and other business practices associated with involution that reduce profits and revenue. As manufacturers struggle to generate enough cash flow to pay interest on

debts, banks increasingly face the risk of non-performing loans (NPLs) and loan defaults. Banks are forced to set aside higher loan-loss provisions or permanently write off debts when involutionary competition drives manufacturers into insolvency, both of which reduce profitability and weaken balance sheets. Government mandates and directives that implicitly or explicitly encourage banks to fund strategically important industries can further complicate the problem by increasing pressure to continue lending to financially distressed manufacturers. For example, during the 2013 downturn in China's solar market, Bank of China reported that approximately 21% of its solar loans were non-performing, showing how involutionary competition can increase credit risk for banks lending out money to industrial firms.

Local governments are affected by involutionary competition when declining profits and losses reduce revenue from corporate income taxes paid by manufacturers operating within their jurisdiction. They may also incur financial losses on money invested in manufacturers and face additional liabilities when those companies default on government-backed loans. Furthermore, local governments may be forced to commit capital resources to keep struggling manufacturers afloat–through subsidies, bailouts, and other forms of financial assistance–to avoid mass unemployment or slowdowns in economic activity. For example, in 2016, the Heilongjiang provincial government provided approximately $298.5 million in credit to the financially distressed Longmay Mining Group, partly to avoid a shutdown that would put some 200,000 workers out of employment, while Hefei-led strategic investors committed RMB 7 billion (approximately $1 billion) to NIO China in 2020. These expenditures can strain government budgets and divert capital that could be allocated to activities that benefit the public, such as providing or improving public services and infrastructure.

The broader economy is affected by involutionary competition in multiple ways. The first is slower GDP growth caused by declines in household consumption and aggregate demand. When manufacturers start reducing worker compensation and headcount to offset declining margins, household incomes drop. Consumers may respond by pulling back on discretionary spending and prioritizing savings, weakening demand for goods and services across other sectors and fueling deflation. In 2025, the share of household savings in China's GDP was roughly 20%, roughly twice the OECD average[17] While high household savings in China reflect broader economic conditions, such as gaps in social safety nets and sluggish economic growth, stagnant wages can also fuel precautionary saving. China's manufacturing industry accounts for a disproportionate share of employment in the country, meaning that decisions by manufacturers to cut worker compensation can further reducing the purchasing power of households, reduce discretionary consumption, and reinforce the weak demand that contributes to involutionary price competition.

Involutionary competition can discourage investment in new equipment, factory upgrades, and the development of new technologies that could improve production efficiency and total factor productivity (TFP). This can negatively impact economic growth by obstructing continuous innovation and productivity improvements that enable industrial economies to produce more outputs with fewer resources. This particular problem is already present in the Chinese economy: a report by HSBC Asset

Management published earlier this year identified involutionary competition as one of the factors contributing to deflationary pressures that have compressed corporate profits and weakened incentives for productivity-enhancing investments.

Another way involutionary competition affects the economy is by increasing overinvestment and resource misallocation. In industrial economies, overinvestment occurs when capital poured into productive activities, such as manufacturing and processing, yields diminishing returns. By contrast, resource misallocation occurs when capital and labor remain trapped in low-value production and low-margin competition instead of flowing to higher-value productive activities that generate stronger profits. Manufacturers may invest in additional production and expand capacity to amortize fixed production costs across more products and potentially achieve profits through economies of scale in the face of falling prices. However, when multiple manufacturers pursue the same strategy, industrial production and manufacturing capacity may expand faster than demand, leading to oversupply and low capacity utilization. The prevalence of overproduction and overcapacity in China's industrial economy is well-documented. For example, a report from the International Energy Agency shows that global solar manufacturing capacity was more than double projected PV demand by the end of 2024, with more than 80% of capacity located in China.

Chinese manufacturers often rely on credit lines provided by banks, local governments, and state-owned investment vehicles to finance capacity expansion, sustain production, and cover operating expenses despite dwindling profits. Debt-fueled spending can drive GDP growth by financing factory construction, equipment purchases, and other productive services. However, when those investments yield diminishing or negative returns because firms are trapped in involutionary competition, they can increase financial risks that propagate throughout the system and make the economic environment less than optimal. The risk of manufacturers defaulting on bank-provided loans increases as shrinking profits reduce operational cash flow and complicate efforts to meet financial obligations, including debt servicing. Furthermore, banks that continue to finance unprofitable manufacturers may be constrained in their ability or willingness to extend credit to other businesses, limiting company formation, market entry, and resulting in economic slowdowns. The effects of resource misallocation can show up more directly in economic indicators, such as aggregate productivity and GDP levels. A case in point: a report by International Monetary Fund (IMF) estimates that resource misallocation associated with China's industrial policies reduces aggregate productivity by roughly 1.2% and the level of GDP by as much as 2%.

Can China escape the involution trap?

One of the main drivers of involutionary competition in China is competition between local governments to attract investment, create jobs, and increase economic output. This competition primarily results from the practice of evaluating officials by how well regions under their jurisdiction perform on GDP per capita, fiscal revenue, infrastructure investment, profitability of state-owned enterprises, and other measurable indicators of economic growth. Performance on these evaluations often contribute significantly to officials' career prospects, which creates an incentive for local

governments led by those officials to make concessions, such as providing tax breaks, subsidies, and cheap financing, to attract manufacturers. These policies contribute significantly to involutionary competition by allowing companies to sustain low-margin operations and withstand financial losses without going out of business.

Addressing involutionary competition in China's industrial economy would require overhauling performance rubrics and avoiding undue emphasis on GDP growth, manufacturing output, and industrial investment in evaluations. The central government, led by the Chinese Communist Party (CCP), has taken efforts in this direction, issuing a directive in December 2013 for party officials to incorporate other performance indicators when evaluating junior officers instead of focusing on GDP alone. However, in September 2025, China's National Development and Reform Commission (NDRC) called for reforms to evaluations of local government officials and identified the role of excessive competition to attract industrial investment, local protectionism, and emphasis on short-term economic achievements in driving involutionary competition. That local governments in China still engage in tournament-style competition on measurable indicators of economic growth suggests that the incentives driving these behaviors are entrenched and may be difficult to address through policy directives alone.

High barriers to exit represent another obstacle to addressing involutionary competition. Local governments may keep providing financial support to distressed manufacturers, partly driven by policies that focus on preserving employment and production activity at all costs, preventing bankruptcies, restructuring, and consolidations. Curbing involutionary competition would require restricting how much financial assistance unprofitable firms receive, whether from local governments or state-owned banks, which would allow capital-inefficient manufacturers to exit the market and restore incentives that force companies to optimize for profits in healthy markets. In April 2026, China's State Administration for Market Regulation (SAMR) introduced a pilot program across seven provincial-level jurisdictions to facilitate the compulsory liquidation of unprofitable companies that have previously remained operational through government subsidies or bank loans. This initiative, amongst many others, shows that Chinese authorities now recognize the importance of reducing barriers to exit in addressing involutionary industrial competition.

Increasing household consumption is another important aspect of addressing involutionary competition. As we explained previously, manufacturers are more likely to engage in price wars when demand for industrial products is weak. Solving the problem of high household savings and low consumption may require creating safety nets for citizens, such as social security programs, which may reduce the need to allocate a greater part of household income to precautionary saving. However, it is important to make sure that manufacturers do not use the temporary (or permanent) increase in demand to justify imprudent capacity expansion, overproduction, and aggressive price competition. Furthermore, it may be necessary to assess consumer demand beforehand: if consumers prefer to spend additional income on services, for example, dining, travel, and entertainment, instead of

manufactured goods such as EVs, household appliances, and consumer electronics, increasing household incomes may be insufficient to address involution and stop it from complicating China's effort to build a strong and financially sustainable industrial economy. ■

Footnotes

1. Other features of involutionary competition include overcapacity, overproduction, overinvestment, and resource misallocation. Although related to price wars, these phenomena are distinct and may occur independently of aggressive price competition. They may, however, reinforce price wars by encouraging manufacturers to expand manufacturing capacity and production beyond reasonable limits, given market demand, intensifying competition for customers and putting downward pressure on prices. ↩

2. In game theory, tit-for-tat is a strategy in repeated games where a player cooperates on the first move and then replicates the opponent's previous action on every turn thereafter. ↩

3. An Edgeworth cycle describes how firms repeatedly undercut each other's prices to gain market share. As margins erode, one firm relents and raises prices to restore profitability, encouraging competitors to follow or risk getting stuck at unprofitable prices. However, the incentive to undercut reappears and the cycle starts all over. A visualized Edgeworth cycle resembles a sawtooth wave, reflecting gradual price declines followed by sharp upward resets. ↩

4. Upfront costs are expenses that a manufacturer must be covered before production can start, regardless of initial output volume. Examples include factory construction, initial research and development (R&D), and machinery. ↩

5. Fixed operating and financing costs are expenses required to keep a manufacturing operation running and meet financing obligations regardless of output volume. These include factory rent, interest payments, amortized upfront costs, ongoing R&D, property taxes, and salaries. ↩

6. Variable production costs change with output and include expenses such as raw materials and production labor. They may also change with economic conditions; for example, raw materials may cost more during supply shortages. ↩

7. Unlike digital software, which can be copied at near-zero cost, physical goods additional costs on every additional unit produced once the factory is already running. For example, an EV manufacturer has to buy raw materials (steel and battery cells) and pay workers for every car that rolls off the assembly line. ↩

8. The unit margin is the difference between the price of a product and the marginal cost of producing every unit. For example, if a manufacturer incurs $10 in marginal costs per unit and sells the product for $15, the unit margin is $5. ↩

9. Suppose a manufacturer produces 1,000 units of a product at a marginal cost of $10 per unit and incurs $2,000 in fixed costs. If it sells all 1,000 units for $15 each, it earns $3,000 in profit. At $12 per unit, it breaks even; at $8 per unit, it loses $4,000. ↩

10. For example, China's 15th Five-Year Plan (2026-2030) identifies renewable energy, new-energy vehicles (NEVs), robotics, biomedicine, and aerospace as strategic industries. These are industries in which China

seeks to establish global leadership, achieve technological self-sufficiency, or both. ↩

11. Obsolescence risk is the risk that unsold products lose value because they become outdated, for example, when a newer technology or model becomes available. ↩

12. Holding costs are the costs of keeping unsold inventory, including storage, financing, and the opportunity cost of capital tied up in goods. ↩

13. Monetary recovery is the process of converting goods into money through sales and receiving payment. In Marx's account of the circuit of capital, this is the stage at which *commodity capital* is converted to money capital, allowing the firm to finance another round of production. ↩

14. In a study of 4,759 publicly listed Chinese firms, researchers Aijun Yang and Shiguang Gu find that price wars are more likely to occur when supply exceeds demand, making it difficult for firms to sell their products and recover capital necessary to sustain operations and investment. ↩

15. For example, in November 2023, capacity utilization in China's battery industry fell below 50% due to lower market demand. Facing pressure to clear unsold inventory, some manufacturers sold battery cells at low prices, with the lowest-quoted price for energy-storage cells dropping to roughly RMB 0.40 (US$0.056) per watt-hour. For context, industry estimates put the production cost of 280Ah LFP energy-storage cells at RMB 0.42-0.50/Wh (US$0.059-$0.070). ↩

16. In standard competition, also known as Bertrand competition, undercutting prices set by competitors may not always lead to substantial gains in market share, particularly when products are sufficiently differentiated on product quality, technological innovation, and brand value. However, when products are homogeneous and interchangeable, price undercutting can help a company temporarily capture market share as consumers switch to the cheaper option. ↩

17. Measured as a share of household disposable income, China's household saving rate was 31.3% in 2023, compared with an OECD average of 5.4%, according to the World Bank. ↩