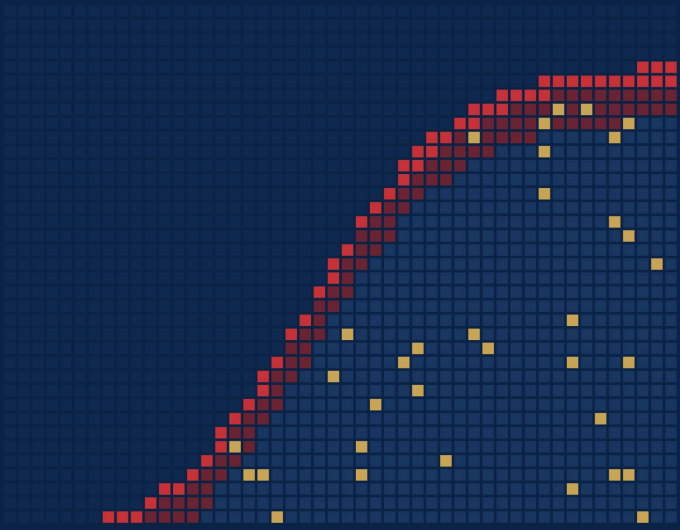
10 MODELS
30 YEARS OF DATA

28% OF WORLD MANUFACTURING
ONE COUNTRY



THE SCALE MACHINE

China's Competitive Edge from 2015 to 2035, and the Strategic Shifts It Will Force

2015 TO 2035

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THE SCALE MACHINE

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The Scale Machine. China's Competitive Edge from 2015 to 2035, and the Strategic Shifts It Will Force.

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Data were extracted in November 2026 from the World Bank World Development Indicators, the IMF World Economic Outlook (October 2026), the Penn World Table 11.0, the Harvard Growth Lab Atlas of Economic Complexity, the UN World Population Prospects 2024, Our World in Data, the International Federation of Robotics and official Chinese statistical releases. Every figure and table names its source.

Nothing in this book constitutes investment, legal or tax advice.

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The question is no longer whether China can make things. It can make almost everything, at a scale no economy has ever reached. The question for the next ten years is what that scale is worth when the people who buy, finance and supply it begin to say no.

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Preface

In October 2026, customs officials in Beijing reported that China's goods trade surplus had passed one trillion dollars for the second year running, and that it had done so a full month earlier than the year before. Exports had risen by more than a third in a single month. Chips, servers, cars and batteries were leaving Chinese ports at a pace that no other economy has matched in peacetime. In the same weeks, the country's statisticians confirmed that births had fallen to their lowest level since records began, that the population had shrunk for a fourth consecutive year, that new home prices were still falling, and that one young urban worker in five was without a job at the peak of the graduation season.

Those two sets of facts describe the same economy. That is the puzzle this book sets out to solve. China in 2026 is at once the most formidable industrial competitor the world has seen and an economy whose domestic engines are visibly tiring. Its factories are winning. Its households are cautious, its local governments are indebted, its working-age population is shrinking and its access to the most advanced technologies is fenced in by export controls. Any honest account of Chinese competitiveness has to hold both pictures in view at once.

Most writing on the subject chooses one. One school describes an unstoppable machine that will dominate every industry it enters. The other describes a debt-laden, ageing, overbuilt economy on the edge of a Japanese-style stagnation. Each school has its data, and each is partly right. The purpose of this book is to put the two schools on the same scale, to measure what has actually driven China's competitive gains over the last ten years, and to model, with explicit assumptions, what those drivers can and cannot deliver over the next ten.

What this book does

The book covers two decades: the ten years from 2015 to 2025, which began with the launch of the Made in China 2025 strategy and ended with China producing more than a quarter of the world's manufactured value added, and the ten years from 2026 to 2035, which begin with the 15th Five-Year Plan and end at the date Beijing has set for "basically realising socialist modernisation." For both decades, the analysis rests on long statistical series, most of them running from 1995 or 2000 to 2025, covering more than twenty indicators for China and a peer group of comparison economies: the United States, Japan, Germany, South Korea, India, Vietnam and Mexico, with the world total as a benchmark.

The data come from the sources that international economists use and that readers can check: the World Bank's World Development Indicators, the International Monetary Fund's World Economic Outlook of October 2026, the Penn World Table 11.0 produced by the University of Groningen, the Atlas of Economic Complexity of the Harvard Growth Lab, the United Nations' World Population Prospects, the International Federation of Robotics,

and the statistical releases of China's National Bureau of Statistics and General Administration of Customs. Every chart and table in the book names its source.

On these data, the book builds a set of original models. A growth accounting framework separates the contributions of capital, labour, education and productivity to Chinese growth since 1995. A constant market share analysis splits China's export gains into the parts due to world demand, to product mix and to pure competitiveness. A composite index, the GSF Competitiveness Index, ranks eight economies on six pillars of competitiveness over twenty years. A production-function model, run ten thousand times with randomly drawn assumptions, maps the range of plausible growth paths to 2035. A trade-shock model estimates what different tariff scenarios would cost China. And a scenario framework combines these pieces into four possible worlds for 2035, each with an estimated probability.

What the book finds

The central finding can be stated in one sentence. Over the last ten years, China converted scale into capability faster than any large economy in modern history, and over the next ten years, the binding constraint on its competitiveness will no longer be what it can make but who will let it sell, at what price, and with whose technology.

The supporting findings are developed chapter by chapter. China's position in the GSF Competitiveness Index rose from fifth of eight economies in 2015 to second in 2024, overtaking Japan, Germany and the United States on the composite measure, although it still trails all three on productivity and on the depth of its innovation system. The engine of that rise was not cheap labour, which ended as a competitive weapon more than a decade ago, but a combination of scale, dense supply chains, falling prices for capital goods, very large public and private investment in technology and a policy system able to concentrate resources on chosen sectors. Total factor productivity, the part of growth not explained by more capital and labour, still contributed between one and two percentage points a year, but the amount of investment needed for each point of growth has more than doubled since the 2000s.

The model results for 2026 to 2035 point to an economy that will remain extremely competitive in manufacturing while growing more slowly at home. In the median simulated path, real growth averages about 3.6 percent a year from 2026 to 2030 and about 2.7 percent from 2031 to 2035, with productivity the single variable that moves the outcome most. China's share of world goods exports, which our logistic model suggests is close to its saturation level, is likely to stay between about 15 and 17.5 percent, depending on how fragmented world trade becomes. In market dollars, the probability that China's economy overtakes that of the United States by 2035 is, on our assumptions, below two percent.

How to read this book

The book is organised in five parts. Part I defines competitiveness for a continental economy and sets out the data portrait. Part II examines the engines of the last ten years, one

chapter at a time. Part III examines the fault lines: demography, the investment and debt trap, deflation, the consumption gap and the technology chokepoints. Part IV contains the models and the scenarios. Part V draws the strategic implications: the shifts China itself is likely to make, the responses of the United States, the European Union and the Global South, the outlook for key industries and the lessons for governments, firms and investors.

Readers in a hurry can start with the Executive Summary, the key points that open each chapter and the Epilogue, which answers ten direct questions about 2035. Readers who want to check the arithmetic will find the methods, the data sources and additional statistical tables in the twenty appendices, which also contain a sector atlas of 24 product groups, profiles of seven comparison economies and ten Chinese firms, a chronology from 2013 to 2026, sensitivity analyses and a discussion of the reliability of Chinese statistics. In all, the book contains more than 100 figures and 75 tables. The models are deliberately transparent. Their assumptions are written down, their sensitivity to those assumptions is reported, and their results should be read as structured reasoning about the future, not as predictions.

This book is a collective work of the contributors of Global Strategy Files. Its aim is the one that guides all our work: to give decision makers a clear, quantified and independent view of the forces that will shape the global economy in the coming decade.

Global Strategy Files, November 2026

Executive Summary

China's competitiveness is the single most important structural force in the world economy of the 2020s. This book measures it over twenty years of data, explains what drove it from 2015 to 2025, and models what can happen to it from 2026 to 2035. Its main conclusions are summarised below, followed by the figures that support them.

The last ten years: from scale to capability

China became the world's factory and then outgrew the label. China's share of world manufacturing value added rose from about 9 percent in 2004 to 26 percent in 2015 and 28 percent in 2024, more than the United States, Japan and Germany combined. Its share of world merchandise exports rose from 7 percent in 2005 to more than 14 percent in 2025, and its goods trade surplus passed one trillion dollars in 2025 and again in the first ten months of 2026.

Cheap labour stopped being the story long ago. Measured in dollars and adjusted for productivity, Chinese unit labour costs rose from about 36 percent of the American level in 2005 to more than 60 percent in 2015, before easing to about 51 percent in 2023. Chinese labour compensation per worker rose roughly eightfold in dollar terms between 2005 and 2023. China kept winning market share anyway, which means its advantage now lies elsewhere.

The advantage is capability built on scale. According to the Harvard Growth Lab, China's Economic Complexity Index rose from 0.61 in 1995 to 1.26 in 2024, overtaking the United States (1.12) and closing in on Germany (1.36). The export-weighted complexity of China's products rose faster than that of any other large economy in our sample. China installed 354,000 industrial robots in 2025, 59 percent of the world total. It spent 3.93 trillion yuan on research and development in 2025, or 2.80 percent of GDP, above the OECD average for the first time, and in purchasing-power terms its research spending is now roughly equal to that of the United States.

The composite verdict. On the GSF Competitiveness Index, which combines ten indicators across six pillars (scale, capability, innovation, productivity, cost and foundations), China rose from fifth of eight economies in 2015 to second in 2024, behind South Korea and ahead of Japan, Germany and the United States. Its gain of almost thirteen points was the second largest in the sample, after Vietnam.

But the growth engine is tiring. Growth accounting on Penn World Table data shows that real growth slowed from 10.7 percent a year in 2005 to 2010 to 4.6 percent in 2019 to 2023. Employment now subtracts from growth. Total factor productivity growth fell from almost 5 percent a year before 2010 to about 1.4 percent. The investment needed per point of growth (the incremental capital-output ratio) rose from about 3.6 in 2001 to 2007 to 8.6 in

2020 to 2024. China still invests around 40 percent of its output while households consume only about 40 percent of it.

The fault lines

Demography. China's population has fallen for four years. Births were 7.92 million in 2025. On United Nations projections, the working-age population will fall by about 57 million between 2025 and 2035, while the number of people aged 65 and over will rise from 211 million to 313 million.

Deflation and involution. The GDP deflator was negative in 2023, 2024 and 2025, the longest run of falling prices since the late 1990s. Price wars in cars, solar panels, batteries and food delivery led Beijing to launch an "anti-involution" campaign. Producer prices turned positive in 2026, but mostly because the Middle East war raised energy costs, not because domestic demand recovered.

Debt. Bank credit to the private sector reached 194 percent of GDP in 2024. The IMF projects China's general government gross debt to rise from 99 percent of GDP in 2025 to about 120 percent in 2030. The property sector, once a quarter of the economy by some estimates, has contracted for five years.

Technology chokepoints. China still imports most of the advanced chips, chipmaking tools, aircraft engines and scientific instruments it needs. Its customs data show an integrated circuit import bill of about 3.04 trillion yuan (roughly 425 billion dollars) in 2025, more than its spending on imported crude oil.

The next ten years: what the models say

Growth. The GSF Potential Growth Model, run ten thousand times with randomly drawn assumptions, gives median real growth of about 3.6 percent a year from 2026 to 2030 and 2.7 percent from 2031 to 2035. There is about a one in four chance of averaging more than 4 percent in the first half of the decade, and only a one in thirty chance in the second half. Productivity growth is the variable that matters most: moving it from the tenth to the ninetieth percentile of our range changes average growth in 2031 to 2035 from 1.6 to 3.7 percent.

Size. In the median path, China's GDP in market dollars reaches about 30 trillion dollars in 2035, about two thirds of the American level. The probability that China overtakes the United States in market dollars by 2035 is below two percent on our assumptions. In purchasing-power terms China is already larger.

Exports. A logistic model of China's share of world goods exports (15.9 percent in 2024 on the Atlas data) suggests that it is close to saturation at around 16.5 percent. Under fragmentation it could fall below 15 percent by 2035; under a technology-led breakout it could rise towards 17.5 percent. Either way, the era of rapidly rising market share is over. Growth in Chinese exports will increasingly come from moving up the value chain and from producing abroad.

Trade shocks. A first-round estimate suggests that an additional 30-point American tariff on all Chinese goods would cut Chinese exports by about 136 billion dollars after rerouting, or about 0.6 percent of GDP. A combined fragmentation scenario, with American escalation and broad European safeguards, would cost about 250 billion dollars of exports and about 1.1 percent of GDP. These are painful but not decisive losses, which explains why tariffs alone have not reversed China's surplus.

Four worlds in 2035. Combining the models, we assign the following probabilities to four scenarios: a *Frontier Republic* that is both technologically advanced and rebalanced towards consumption (15 percent); a *Fortress Factory* that is technologically strong but still investment and export led (20 percent); a *Comfortable Plateau* that rebalances but grows slowly (29 percent); and a *Japanification with Chinese characteristics* in which neither technology nor rebalancing delivers (37 percent).

The strategic shifts ahead

The book identifies ten strategic shifts that China's competitiveness is likely to force over the next decade, on China itself and on the rest of the world. Beijing will move from exporting goods to exporting factories, from importing technology to setting standards, from dollar to yuan payment rails where it can, and from price competition towards consolidation. The United States will keep tightening technology controls while depending on Chinese inputs in many supply chains. The European Union will build a sector-wide defence against Chinese overcapacity. The Global South will become the main battlefield for Chinese market share, investment and technology standards. Firms everywhere will have to plan for a world in which China is simultaneously their cheapest supplier, their fiercest competitor and a source of political risk.

Ten numbers that define China's competitive position

- 28 percent: China's share of world manufacturing value added in 2024
- 1.04 trillion dollars: goods trade surplus in January to October 2026
- 1.26: China's Economic Complexity Index in 2024, above the United States
- 59 percent: China's share of world industrial robot installations in 2025
- 2.80 percent: R&D spending as a share of GDP in 2025
- 0.47: China's total factor productivity as a fraction of the American level
- 8.6: investment needed per point of growth, 2020 to 2024
- minus 57 million: projected change in working-age population, 2025 to 2035
- 2.7 percent: median simulated growth rate for 2031 to 2035
- 37 percent: probability we assign to a Japan-style plateau by 2035

How This Book Works: Data, Models and Conventions

This short guide explains the data on which the book rests, the models it uses and the conventions it follows. Full technical details are in the appendices, which also include sensitivity analyses, country and sector profiles, company case studies, a chronology and a discussion of the reliability of Chinese statistics.

The data

The analysis is built on more than twenty long statistical series for China and a group of comparison economies. Most series start in 1995 or 2000 and end in 2024 or 2025, depending on the release schedule of the source. The comparison group was chosen to answer three questions. Against whom does China compete at the technological frontier? The United States, Japan, Germany and South Korea. Who is competing with China for the next wave of manufacturing investment? Vietnam, India and Mexico. And how large is China relative to the whole? For that, the world total.

Seven families of sources are used throughout.

1. **World Bank, World Development Indicators.** Eighty-five indicators were extracted for fifteen economies over 1995 to 2025, covering output, investment, consumption, trade, prices, finance, demography, education, energy and innovation.
2. **International Monetary Fund, World Economic Outlook, October 2026.** Real growth, nominal GDP in dollars and at purchasing power parity, inflation, unemployment, fiscal balances and debt, with projections to 2031.
3. **Penn World Table 11.0.** Released by the Groningen Growth and Development Centre in October 2025 and covering data to 2023, it provides capital stocks, employment, human capital, the labour share and total factor productivity at constant national prices and relative to the United States.
4. **Atlas of Economic Complexity, Harvard Growth Lab.** Trade data for about 1,240 products at the four-digit level of the Harmonized System (1992 classification), from 1995 to 2024, together with the Economic Complexity Index and product complexity measures. The Atlas cleans and reconciles the reports of exporters and importers, so its totals differ slightly from customs figures.
5. **United Nations, World Population Prospects 2024.** Population by age, with the medium-variant projections used for 2026 to 2050.
6. **Sectoral sources.** The International Federation of Robotics for robot installations, the International Renewable Energy Agency and Ember for energy, the International Energy Agency for electric vehicles, the World Intellectual Property Organization for patents and Clarksons Research for shipbuilding, mostly as compiled by Our World in Data or reported in official releases.

7. **Chinese official sources.** The National Bureau of Statistics, the General Administration of Customs, the National Energy Administration and the Ministry of Commerce, for the most recent data and for 2026 developments.

Where Chinese and international sources disagree, the book says so. Chinese official statistics are used as reported, with the usual caveats. On the most debated series, notably GDP growth, the book cross-checks with indicators that are harder to manipulate, such as electricity generation, trade reported by partner countries and robot installations reported by suppliers.

The models

Eight analytical tools are used, each explained where it first appears and documented in the appendices.

- **Growth accounting** (Chapter 4): decomposes real GDP growth into the contributions of physical capital, employment, human capital and total factor productivity, using a Cobb-Douglas production function with a capital share taken from the data.
- **Unit labour cost and productivity comparisons** (Chapter 5): combine Penn World Table labour shares with World Bank output and employment data to measure labour costs per unit of output in a common currency.
- **Revealed comparative advantage and complexity analysis** (Chapter 7): the Balassa index of revealed comparative advantage, computed for nine sectors and over 1,200 products, and export-weighted product complexity.
- **The GSF Competitiveness Index** (Chapter 18): a composite index of ten indicators in six pillars, normalised to a 0 to 100 scale, with weights derived from principal component analysis and checked against equal weights and leave-one-pillar-out variants.
- **The GSF Potential Growth Model** (Chapter 19): a production-function model calibrated on the Penn World Table and projected to 2035 with UN labour force data, run 10,000 times with random draws for productivity growth, the investment rate, labour participation, human capital and depreciation.
- **Constant market share analysis and a logistic share model** (Chapter 20): split China's export growth into world demand, product mix and competitiveness effects, and estimate the saturation level of its share of world exports.
- **A trade-shock model and a scenario framework** (Chapters 22 and 23): estimate first-round effects of tariff scenarios and combine model outputs into four scenarios for 2035.
- **A panel regression of export shares** (Chapter 20): tests, on six large exporters over 1996 to 2024, whether high export shares tend to revert and how exchange rates and complexity affect them.

Conventions

Unless stated otherwise, dollars are United States dollars, growth rates are real and annual, and shares are percentages. "Billion" means a thousand million and "trillion" a thousand billion. Purchasing power parity (PPP) figures use the International Comparison Program rounds embedded in each source. Periods written as "2015 to 2025" include both end years. Projections are labelled as such and should be read as conditional scenarios, not forecasts. Where the book quotes a figure for 2026, it refers to the latest official data available in November 2026, usually covering the first nine or ten months of the year.

The book refers to China's mainland economy. Hong Kong, Macau and Taiwan are treated separately when they appear in the data, following the conventions of the international sources.

Abbreviations

Abbreviation	Meaning
AI	Artificial intelligence
ASEAN	Association of Southeast Asian Nations
BRI	Belt and Road Initiative
CATL	Contemporary Amperex Technology Co. Limited
CBAM	Carbon Border Adjustment Mechanism (European Union)
CCI	GSF Competitiveness Index
CMSA	Constant market share analysis
CPTPP	Comprehensive and Progressive Agreement for Trans-Pacific Partnership
CRRC	China Railway Rolling Stock Corporation
ECI	Economic Complexity Index
EU	European Union
EUV	Extreme ultraviolet (lithography)
EV	Electric vehicle
FDI	Foreign direct investment
GDP	Gross domestic product
GSF	Global Strategy Files
GW, GWh	Gigawatt, gigawatt hour
HS	Harmonized Commodity Description and Coding System
ICOR	Incremental capital-output ratio
IEEPA	International Emergency Economic Powers Act (United States)
IFR	International Federation of Robotics
ILO	International Labour Organization
IMF	International Monetary Fund
LGFV	Local government financing vehicle
LPI	Logistics Performance Index (World Bank)
NBS	National Bureau of Statistics of China
NEV	New energy vehicle
NPC	National People's Congress
OECD	Organisation for Economic Co-operation and Development
PCA	Principal component analysis
PCI	Product Complexity Index
PPP	Purchasing power parity
PV	Photovoltaic
PWT	Penn World Table
R&D	Research and development
RCA	Revealed comparative advantage
RCEP	Regional Comprehensive Economic Partnership
REER	Real effective exchange rate
SMIC	Semiconductor Manufacturing International Corporation
SOE	State-owned enterprise
STAR Market	Science and Technology Innovation Board of the Shanghai Stock Exchange
TEU	Twenty-foot equivalent unit
TFP	Total factor productivity
ULC	Unit labour cost
UN	United Nations
USTR	Office of the United States Trade Representative
WDI	World Development Indicators (World Bank)
WEO	World Economic Outlook (IMF)
WTO	World Trade Organization

PART I

Measuring a Competitive Giant

What competitiveness means for an economy of 1.4 billion people, what thirty years of data show, and why the decade from 2015 to 2025 changed the question.

CHAPTER 1

What Competitiveness Means for a Continental Economy

Key points

- Competitiveness is not a trade surplus. It is the ability to sell in open markets while raising the incomes of the people who produce.
- For a continental economy like China, scale itself is a source of advantage, because it lowers costs, deepens supply chains and finances learning.
- The book measures competitiveness through five engines (cost, scale, capability, innovation and the state) and three constraints (demography, finance and access to technology).
- The central question for 2026 to 2035 is whether capability can replace the engines that are fading.

A contested word

Few words in economics are used as loosely as competitiveness. Politicians use it to mean jobs, firms use it to mean market share, and economists often avoid it altogether. Paul Krugman famously warned in the 1990s that countries do not compete with each other in the way companies do, and that talking about national competitiveness can lead governments into protectionism and wasteful subsidies. He had a point. A country that runs a trade surplus is not necessarily stronger than one that runs a deficit. The United States has run deficits for half a century and remains the richest large economy on earth.

Yet the word refuses to go away, and for good reason. When we ask whether China is competitive, we are asking something real: whether Chinese producers can sell more, at better prices, in more sophisticated products, in more markets, than their rivals, and whether they can keep doing so as wages rise, technology advances and politics intervenes. That is a question about the productive structure of an economy. It has measurable answers.

This book adopts a working definition that combines the two dimensions economists care about most. An economy is competitive when it can sell its goods and services in open markets while sustaining rising incomes for the people who produce them. The first half of the definition captures market performance: shares of world exports, of manufacturing output, of new industries. The second half captures the quality of that performance. An economy that wins market share only by holding down wages, by subsidising losses or by letting its currency fall is buying market share, not earning it. Over time, such gains are fragile.

By this definition, China's case is unusually rich. Over the last thirty years, Chinese producers have won more market share than those of any economy in history. Chinese incomes have also risen dramatically: GDP per person at purchasing-power parity roughly quadrupled between 2005 and 2025, from about 6,300 to about 25,000 international dollars

at 2021 prices. On both halves of the definition, China has been a competitive success. The question for the next decade is whether it can remain one, and at what cost to whom.

Why scale changes the rules

Most economic theories of trade were developed with small or medium-sized economies in mind. In the classic models, a country specialises in what it does relatively well, trades for the rest, and gains from the exchange. Its size does not matter much. China breaks this framework in at least four ways.

First, scale lowers costs. In industries with large fixed costs and learning effects, such as solar panels, batteries, shipbuilding, electronics assembly or cars, the producer that makes the most units tends to have the lowest costs. Because China's domestic market is so large, Chinese firms can reach efficient scale at home before they export. When they do export, they do so from a cost base that rivals cannot easily match.

Second, scale creates density. A modern product such as an electric car or a smartphone requires thousands of components. The cost of making it depends not only on the factory that assembles it, but on how many suppliers of parts, tools, materials and services are within reach. China's industrial clusters, from the Pearl River Delta to the Yangtze River Delta and now inland provinces, host suppliers for almost every stage of almost every manufactured good. A firm in Shenzhen can design, prototype, source and produce a new device in weeks. That density is a public good for every firm in the cluster, and it is extremely hard to replicate elsewhere.

Third, scale finances learning. Large markets allow many firms to enter, compete and fail. China's electric vehicle industry had more than a hundred brands in the late 2010s. Most will disappear, but the competition among them produced a handful of world-class firms and a deep pool of engineers. The same pattern has occurred in solar, drones, batteries, consumer electronics and, more recently, artificial intelligence models.

Fourth, scale changes the political economy. When a single country produces most of the world's output of a product, its decisions on capacity, prices and exports become decisions for the whole world. Other governments respond. That is why the story of Chinese competitiveness cannot be told without the story of tariffs, export controls, subsidies and trade defence that it has provoked.

Five engines and three constraints

To give structure to the analysis, the book organises the drivers of China's competitiveness into five engines and three constraints. Table 1.1 summarises them and the main indicators used to measure each.

Table 1.1. The analytical framework: five engines and three constraints of Chinese competitiveness

Element	What it means	Main indicators in this book
Engine 1. Cost	The price of labour, capital, energy and land per unit of output	Unit labour costs, labour productivity, real exchange rate, price level
Engine 2. Scale	The size of production, markets and supply chains	Shares of world manufacturing and exports, capacity in key sectors
Engine 3. Capability	The range and sophistication of what can be produced	Economic complexity, product complexity, revealed comparative advantage
Engine 4. Innovation	The ability to create new products and processes	R&D spending, researchers, patents, publications, robots
Engine 5. The state	Industrial policy, finance, infrastructure and coordination	Credit, investment, energy and digital infrastructure, policy programmes
Constraint 1. Demography	A shrinking and ageing workforce	Working-age population, dependency ratio, fertility
Constraint 2. Finance and demand	Debt, property, deflation and weak consumption	ICOR, credit, deflator, household consumption
Constraint 3. Access	Technology controls and trade barriers abroad	Import dependence, tariffs, export controls, market access

Source: Global Strategy Files.

The five engines are not independent. Scale lowers costs and finances innovation. The state shapes all of them, by directing credit, building infrastructure and choosing priority sectors. Capability is in a sense the result of the others: it measures what an economy has learned to do. The three constraints are also linked. An ageing workforce weakens demand and raises the burden of debt. Weak demand pushes firms towards exports, which provokes trade barriers abroad. Trade barriers raise the value of technological self-reliance, which in turn requires more investment and more state direction.

Competitiveness at three levels

A further distinction runs through the book. Competitiveness can be measured at three levels, and China looks very different at each.

At the **product level**, China is overwhelmingly competitive. In hundreds of products, from batteries to toys and from cargo ships to solar cells, Chinese producers supply between a third and two thirds of world exports. In 2024, China accounted for almost 47 percent of world exports of batteries, 45 percent of transmission equipment and about 39 percent of cargo ships, on the Atlas data analysed in Chapter 7.

At the **sector level**, the picture is more mixed. China dominates textiles, electronics, machinery and metals. It is now a major force in vehicles and a rising one in chemicals. It remains weak in agriculture, in mineral exports, in aircraft, in advanced semiconductors and in most knowledge-intensive services.

At the **economy level**, the picture is mixed again. China's output per worker is less than a third of the American level and its total factor productivity is less than half. Its household consumption share of GDP is among the lowest in the world. Its financial system allocates credit with a heavy bias towards state-linked borrowers. An economy can be supremely competitive in many products and still face serious problems as a whole. That gap, between the competitiveness of China's factories and the performance of China's economy, is one of the main themes of this book.

Why the 2015 to 2035 window matters

The book studies two decades because they represent two distinct regimes.

The decade from 2015 to 2025 began with a deliberate policy turn. In May 2015, the State Council published Made in China 2025, a plan to upgrade ten strategic industries and reduce dependence on foreign technology. The plan was later played down in official communication after it attracted hostility abroad, but its logic shaped the decade. It was followed by the trade war with the United States from 2018, by technology export controls from 2019, by the pandemic, by the collapse of the property sector from 2021, by a sharp turn towards technological self-reliance and by an export boom in electric vehicles, batteries and solar products that the Chinese leadership calls the "new three."

The decade from 2026 to 2035 begins with the 15th Five-Year Plan, adopted by the National People's Congress on 12 March 2026. The plan puts "a modern industrial system" first among its objectives, sets a target for research spending to grow by more than 7 percent a year, aims to raise the core digital economy to 12.5 percent of GDP and, for the first time, devotes a full chapter to boosting consumption. It ends in 2035, the year by which the Chinese leadership intends to have "basically realised socialist modernisation" and to have raised GDP per person to the level of a moderately developed country.

The first decade answered the question of whether China could move beyond cheap assembly into sophisticated manufacturing. The answer is clearly yes. The second decade will answer a harder question: whether an economy can stay competitive when its labour force shrinks, its investment returns fall, its largest customers erect barriers and its access to frontier technology is restricted. That is the question to which the rest of this book is devoted.

What competitiveness is not

Before turning to the data, three common confusions are worth clearing up.

Competitiveness is not the same as the trade balance. China's surplus reflects its competitiveness, but also its high saving rate and weak domestic consumption. A more competitive China that consumed more at home could run a smaller surplus. Conversely, a falling surplus would not necessarily mean that China had become less competitive.

Competitiveness is not the same as growth. China's growth has slowed sharply since 2010, while its competitive position in manufacturing has strengthened. Slower growth at home can even increase competitive pressure abroad, as firms facing weak domestic demand cut prices and turn to export markets. Much of the friction of the mid-2020s comes from exactly that mechanism.

Competitiveness is not a zero-sum contest in every respect. Cheap Chinese solar panels have made the energy transition far cheaper for the rest of the world. Cheap Chinese inputs lower costs for manufacturers everywhere. But in industries where China's gains come at the direct expense of established producers in other countries, and where those

producers are politically significant, the contest is perceived as zero-sum, and governments act accordingly. Understanding which is which is essential for anyone trying to anticipate the next decade.

In focus: competitive giants in history

China is not the first economy to dominate world manufacturing, and the experience of its predecessors offers useful perspective. According to the historical estimates of the economist Paul Bairoch, Britain accounted for about 23 percent of world manufacturing output in 1880, at the height of its industrial supremacy. The United States accounted for about 32 percent in 1913 and, after the destruction of European and Japanese industry in the Second World War, for close to 45 percent in the early 1950s. China's share of about 28 percent of world manufacturing value added in 2024 places it in this select company: it is the third economy in modern history to account for more than a quarter of the world's manufacturing.

Each of the earlier giants followed a recognisable arc. Britain's dominance rested on a head start in mechanisation, coal and steam, an empire that provided markets and raw materials, and a financial system centred on London. It was eroded within a few decades by the rise of Germany and the United States, which had larger populations, newer technologies and protective tariffs. Yet Britain remained the world's leading financial power long after it had lost its industrial lead, and sterling remained a major reserve currency until the mid-twentieth century.

America's dominance rested on a continental market, mass production, abundant resources, a culture of engineering and, after 1945, the absence of serious competitors. Its share of world manufacturing declined steadily as Europe and Japan recovered, then as East Asia industrialised, and finally as China rose. But the United States converted its industrial lead into lasting advantages in technology, finance, higher education and the dollar, which have kept it the world's leading economy even as its manufacturing share fell to about 16 percent.

Japan offers a third model, and a cautionary one. In the 1980s, Japanese firms appeared poised to dominate world markets for cars, electronics, semiconductors and machinery. Trade friction with the United States led to voluntary export restraints, the Plaza Accord of 1985, which forced a sharp appreciation of the yen, and the relocation of Japanese production abroad. A domestic asset bubble burst in 1990, and Japan entered three decades of slow growth and deflation, even as its leading manufacturers remained world-class.

Three lessons emerge from these comparisons. First, manufacturing supremacy is always temporary in relative terms: newcomers with lower costs, larger markets or new technologies eventually erode it. Second, the economies that preserved their overall leadership did so by converting industrial strength into strength in technology, finance and institutions. Third, dominance provokes resistance, from tariffs in the nineteenth century to export restraints and currency agreements in the twentieth.

China's situation combines elements of all three precedents. Like Britain and America, it has the scale and the head start to remain a manufacturing leader for decades. Like America, it is investing heavily in technology. Like Japan, it faces trade friction, an investment-driven model reaching its limits and the risk of deflation. Unlike any of them, it is not the leading financial power, its currency is not freely convertible, and it faces a strategic rival in the United States that controls key technologies and the global financial system. Those differences shape the scenarios explored in Part IV.

CHAPTER 2

Thirty Years in Numbers

Key points

- Between 2000 and 2025, China's share of world GDP at purchasing-power parity rose from 7.6 to 19.5 percent, and its share of world manufacturing value added rose from about 9 percent in 2004 to 27 to 28 percent.
- China's share of world population fell over the same period, from 20.5 to 17.1 percent. Its economic weight now exceeds its demographic weight.
- The structure of the economy shifted from industry towards services, while research, patents and education indicators rose by an order of magnitude.
- Since 2023 the GDP deflator has been negative: real growth of about 5 percent has coexisted with nominal growth of about 4 percent.

The arc of a rise

Statistics rarely tell a story as clearly as the four lines of Figure 2.1. In 2000, China accounted for 7.6 percent of world GDP measured at purchasing-power parity, 3.6 percent at market exchange rates and less than 4 percent of world merchandise exports. It was home to more than a fifth of humanity. Twenty-five years later, its share of world GDP at purchasing-power parity had reached 19.5 percent, its share at market prices 16.5 percent and its share of world merchandise exports 14.3 percent. Its share of world population had fallen to 17.1 percent. Sometime around 2021, China's share of world output at purchasing-power parity overtook its share of world population for the first time in modern history.

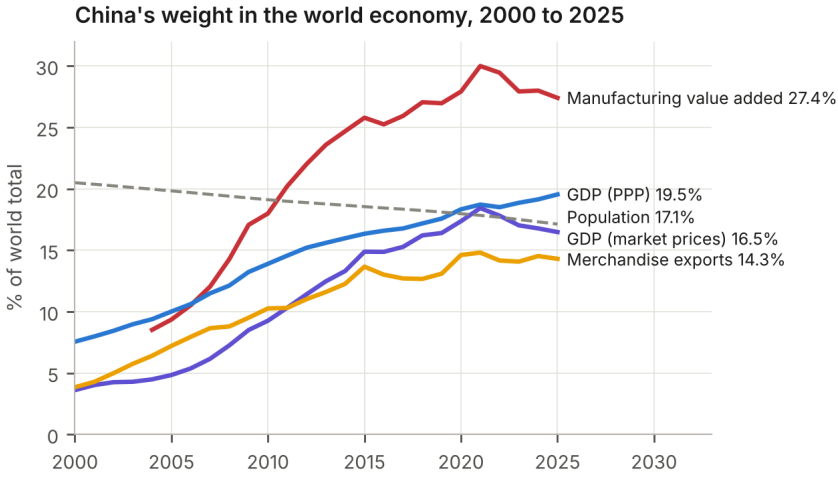


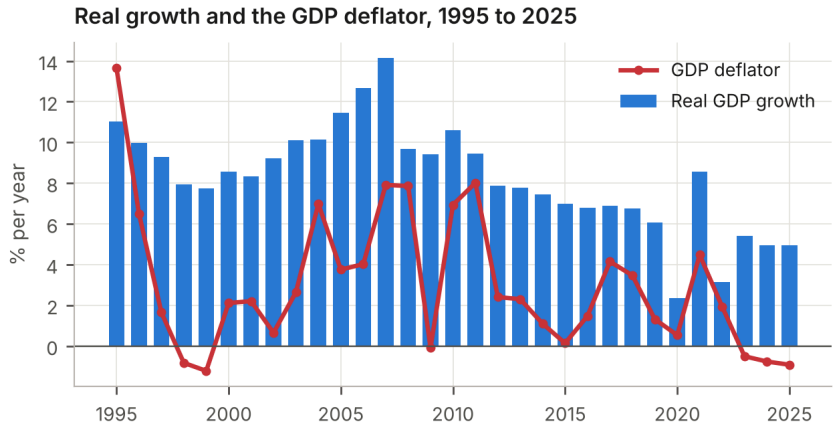
Figure 2.1. China's share of world GDP, manufacturing, exports and population, 2000 to 2025 (%)

The steepest line in the figure is manufacturing. World Bank data on manufacturing value added, measured in current dollars, start for China in 2004, when its share of the world total was about 8.5 percent. By 2010 it had doubled to 18 percent. By 2015 it was almost 26 percent. It peaked at 30 percent in 2021, when the pandemic disrupted production elsewhere and global demand for Chinese goods surged, and stood at about 27 to 28 percent in 2024 and 2025. Some of the recent decline is a currency effect: the renminbi weakened against the dollar after 2022 and Chinese factory prices fell, which reduces the dollar value of Chinese output even when volumes rise. In real terms, Chinese manufacturing output continued to grow.

Two features of the figure deserve attention. The first is the speed of the rise between 2004 and 2015, when China's share of world manufacturing roughly tripled. No large economy has ever moved so fast. The second is the plateau since 2015. Measured in current dollars, China's shares of world manufacturing and exports have moved sideways for a decade. The rapid catch-up phase is over. What has changed since 2015 is less the quantity of China's presence in world markets than its composition, a theme developed in Part II.

Growth and prices

Figure 2.2 shows the path of real GDP growth since 1995 and the GDP deflator, the broadest measure of the price level in the economy. Real growth averaged about 10 percent a year from 1995 to 2010, with a peak of 14.2 percent in 2007. It then declined in steps: to about 7 to 8 percent in the early 2010s, to about 6 to 7 percent in the second half of the decade, and to about 5 percent in the 2020s, with sharp swings during the pandemic years.



Source: World Bank WDI

Figure 2.2. Real GDP growth and GDP deflator inflation, 1995 to 2025 (% per year)

The deflator tells a different story. After the inflationary boom of the 2000s, price growth slowed in the 2010s, with a brush with deflation in 2015 and a brief surge in 2021. From 2023, the deflator turned negative and stayed negative for three consecutive years: minus 0.5 percent in 2023, minus 0.8 percent in 2024 and minus 0.9 percent in 2025. Nominal GDP growth, which is what matters for corporate revenues, wages, tax receipts and debt service, fell to about 4 percent in 2024 and 2025, below the real growth rate. That gap is unusual for an economy at China's level of development. It reflects falling prices for manufactured goods, property and many services, and it is one of the clearest symptoms of the imbalance between supply and demand that runs through this book.

For 2026, the National Bureau of Statistics reported growth of 5.0 percent in the first quarter, 4.3 percent in the second and 4.5 percent in the third, for a cumulative 4.6 percent over the first nine months. The government's target for the year was 4.5 to 5 percent, the lowest range set since 1991. Producer prices rose sharply in the second half of 2026, up 5.7 percent year on year in October, but consumer prices rose by only 0.7 percent, and core consumer inflation by 0.8 percent. The rebound in factory prices was driven by the energy shock that followed the war in Iran, which closed the Strait of Hormuz to most tanker traffic from March 2026, more than by any recovery in domestic demand.

A dashboard of twenty-eight indicators

Table 2.1 assembles twenty-eight indicators that together describe China's competitive position, for 2005, 2015 and the latest available year. They are grouped loosely by theme: macroeconomic structure, external position, innovation, human capital, demography, finance and infrastructure.

Table 2.1. China's competitiveness dashboard: 28 indicators, 2005, 2015 and latest year

Indicator	2005	2015	Latest	Year
Real GDP growth (%)	11.5	7.0	5.0	2025
GDP, current US$ trillion	2.3	11.3	19.5	2025
GDP per capita, PPP constant 2021 int. $	6,298	14,857	25,067	2025
Gross capital formation (% GDP)	40.2	42.7	40.5	2024
Household consumption (% GDP)	39.8	38.1	40.0	2024
Gross national saving (% GNI)	45.5	45.1	42.7	2024
Manufacturing value added (% GDP)	31.7	28.4	24.7	2025
Services value added (% GDP)	42.1	51.7	57.7	2025
Exports of goods and services (% GDP)	33.4	20.9	21.1	2025
Current account balance (% GDP)	5.7	2.6	3.8	2025
FDI net inflows (% GDP)	4.5	2.1	0.41	2025
High-tech exports (% manuf. exports)	n/a	30.4	26.3	2024
R&D expenditure (% GDP)	1.3	2.0	2.6	2023
Researchers per million people	857	1,163	2,107	2023
Resident patent applications (thousand)	93.5	968	1,672	2024
Scientific articles (thousand)	165	401	933	2023
IP receipts, US$ billion	0.16	1.1	13.1	2025
IP payments, US$ billion	5.3	22.0	46.6	2025
Tertiary enrolment (% gross)	18.7	47.1	76.9	2024
Population 65+ (% total)	7.9	10.1	14.9	2025
Working-age 15-64 (% total)	71.8	71.6	69.7	2025
Fertility rate (births per woman)	1.6	1.7	1.0	2024
Urban population (%)	43.0	57.3	66.3	2025
Domestic credit to private sector (% GDP)	110	150	194	2024
GDP deflator (% change)	3.8	0.13	-0.92	2025
Real effective exchange rate (2010=100)	84.9	129	110	2025
Electricity use per capita (kWh)	1,782	4,017	7,038	2024
Internet users (% population)	8.5	50.3	91.6	2025

Source: World Bank WDI (series extracted November 2026)

Several patterns stand out.

The first is the stability of the macroeconomic structure. Gross capital formation was 40 percent of GDP in 2005, 43 percent in 2015 and 40.5 percent in 2024. Household consumption was 40 percent, 38 percent and 40 percent. The national saving rate fell from its 2008 peak of 51 percent but was still 43 percent of national income in 2024. Two decades of official commitments to "rebalance" the economy towards consumption have left the expenditure structure almost unchanged.

The second is the transformation of the production structure. Manufacturing value added fell from 32 percent of GDP in 2005 to 25 percent in 2025, while services rose from 42 to 58 percent. China is still far more industrial than any other large economy, but it is no longer the industrial monolith of the 2000s. The decline in the manufacturing share is partly a price effect, because manufactured goods became cheaper relative to services, and partly a real shift of employment towards services.

The third is the collapse of external dependence. Exports of goods and services fell from 33 percent of GDP in 2005 to 21 percent in 2015 and have stayed close to that level since.

Foreign direct investment inflows fell from 4.5 percent of GDP to 2 percent in 2015 and to just 0.4 percent in 2025, the lowest level since the early 1990s. China is a much larger exporter than twenty years ago, but its economy is less dependent on exports and far less dependent on foreign capital.

The fourth is the explosion of the innovation indicators. Research and development spending rose from 1.3 percent of GDP in 2005 to 2.6 percent in 2023 and 2.8 percent in 2025. The number of researchers per million people more than doubled. Resident patent applications rose from 93,000 to 1.67 million a year. Scientific articles rose from 165,000 to 933,000. Receipts from foreign users of Chinese intellectual property, negligible in 2005, reached 13 billion dollars in 2025, although China still paid out more than three times as much for foreign intellectual property.

The fifth is the speed of social change. Tertiary enrolment rose from 19 percent of the relevant age group to 77 percent. The urban share of the population rose from 43 to 66 percent. Internet use rose from 8.5 percent to 92 percent. Electricity use per person quadrupled.

The sixth, and the most worrying for the future, is demography. The share of the population aged 65 and over almost doubled, from 7.9 to 14.9 percent. The fertility rate, already low at 1.6 children per woman in 2005, fell to about 1.0 in 2024, among the lowest in the world.

Comparing the peer group

China's indicators look different when set against those of the comparison economies. Table 2.2 shows a selection of structural indicators for the eight economies in our sample.

Table 2.2. Structural comparison of China and the peer group (latest available year)

Indicator	China	United States	Japan	Germany	South Korea	India	Vietnam	Mexico
Share of world GDP at PPP (%)	19.5	14.6	3.2	3.0	1.5	8.1	0.9	1.6
Output per worker (thousand PPP $)	48	157	88	125	99	25	28	48
Manufacturing (% GDP)	24.7	10.5	18.8	17.6	27.4	13.5	24.5	20.0
Gross capital formation (% GDP)	40.5	21.5	27.7	21.9	29.1	34.6	30.8	22.6
Household consumption (% GDP)	40.0	67.9	53.1	53.2	48.0	56.7	53.2	70.2
R&D (% GDP)	2.6	3.5	3.4	3.2	4.9	0.7	n/a	n/a
Economic Complexity Index (2024)	1.26	1.12	1.74	1.36	1.61	0.69	0.67	0.94
Population aged 65+ (%, 2025)	14.9	18.4	30.0	23.7	20.3	7.4	9.5	8.5

Source: World Bank WDI; IMF WEO October 2026; Atlas of Economic Complexity; UN World Population Prospects 2024; GSF calculations. R&D figures are for the latest year reported to the World Bank (2023 for most economies); China's own figure for 2025 is 2.80 percent.

The table captures the central paradox of the Chinese economy in one glance. China's economy is the largest in the world at purchasing-power parity and its export basket is more complex than America's. Yet output per worker is less than a third of the American level and similar to Mexico's. China invests twice as much of its output as the United States, Germany or Mexico, and its households consume a smaller share of output than in any other economy in the sample. China is, at the same time, a technological peer of advanced economies in many manufacturing sectors and a middle-income economy in its average productivity and its living standards.

That combination is the source of both its strength and its fragility. The strength is that a middle-income cost base combined with frontier capability in specific sectors is an almost unbeatable competitive formula. The fragility is that an economy with a middle-income average productivity cannot sustain its investment rate, its debt and its social commitments unless that average productivity keeps rising.

What the numbers do not show

Statistics on this scale inevitably hide as much as they reveal. Four limitations should be kept in mind throughout the book.

First, the reliability of Chinese official data is a perennial debate. Many economists believe that official GDP growth has been overstated in some years, particularly after 2015, by between half a point and two points a year. Independent indicators such as electricity generation, freight volumes and partner-country trade data broadly confirm the direction of the official figures, if not always their precision. In this book, we use official data but cross-check with independent sources wherever possible, and we note where the uncertainty matters for the conclusions.

Second, dollar-based comparisons depend on exchange rates. The renminbi's real effective exchange rate rose by about 30 percent between 2010 and 2015, which flattered China's dollar shares, and has fallen by about 15 percent since 2022, which has depressed them. Chapter 5 returns to this point.

Third, national averages conceal enormous regional differences. The coastal provinces of Guangdong, Jiangsu, Zhejiang and Shanghai have income levels and industrial structures comparable to those of southern Europe. The interior and the northeast look more like middle-income emerging economies. Competitiveness is concentrated in specific clusters, and so are its problems.

Fourth, aggregate statistics capture the past. The most important changes of the last three years, including the rise of Chinese artificial intelligence models, the explosion of chip exports in 2026 and the energy shock from the Middle East, are only beginning to show up in annual data. The rest of the book combines the long series with the most recent monthly data to bridge that gap.

In focus: can we trust the numbers?

Any book that relies on Chinese statistics must confront the question of their reliability. Doubts are long-standing. In 2007, a senior Chinese official reportedly told a foreign diplomat that GDP figures were "man-made" and that he preferred to watch electricity consumption, rail freight and bank lending. Studies by economists at the Federal Reserve, the Brookings Institution and several universities have estimated that official GDP growth may have been overstated in some years, particularly after 2008 and again in the late 2010s, by between half a point and two points a year. Provincial GDP figures, which once summed to more than national GDP, have been revised to remove the most glaring inconsistencies.

How much does this matter for the analysis of competitiveness? Less than one might think, for three reasons.

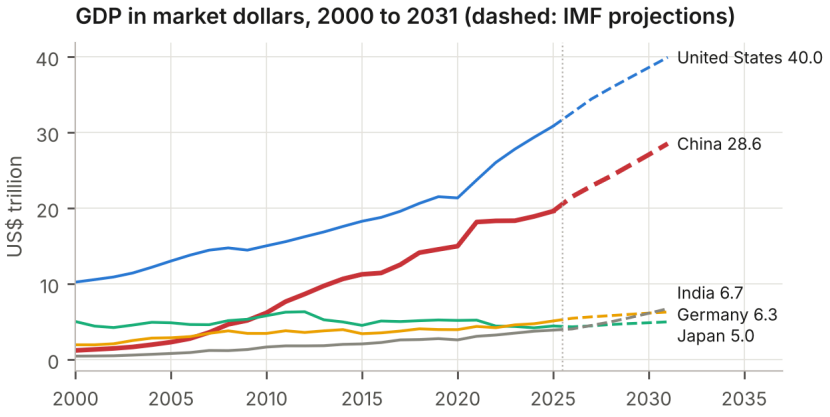
First, many of the indicators used in this book do not come from Chinese national accounts. Trade data are cross-checked against the reports of China's trading partners in the Atlas of Economic Complexity. Robot installations are reported by suppliers to the International Federation of Robotics. Solar and wind capacity is tracked by international agencies and industry associations. Patent applications are reported by the World Intellectual Property Organization. Scientific publications are counted in international databases. These independent sources all confirm the scale and direction of China's competitive rise.

Second, physical indicators broadly corroborate official growth rates over the long run. Between 2005 and 2015, China's electricity generation grew by 8.8 percent a year, slightly less than official real GDP growth of 9.6 percent. Between 2015 and 2025, electricity generation grew by 6.2 percent a year, slightly more than official GDP growth of 5.6 percent, as the economy electrified and data centres, electric vehicles and heat pumps added to demand. Energy consumption grew more slowly, by about 3.8 percent a year between 2015 and 2024, reflecting gains in efficiency and the shift towards services. These patterns are consistent with real growth in the range of 5 to 6 percent a year in the decade to 2025, though they cannot rule out an overstatement of half a point or so.

Third, the conclusions of this book are robust to plausible measurement errors. If official growth since 2015 had been overstated by one point a year, the capital-to-output ratio in 2023 would be about 10 percent higher than our estimate, TFP growth since 2015 would be about one point lower, and China's GDP today would be about 9 to 10 percent smaller. Each of these adjustments would strengthen rather than weaken the book's central argument: that China's domestic growth engine is weaker than its industrial competitiveness.

The figures for prices deserve particular attention. Some economists argue that official deflators understate the fall in prices, especially for industrial products, which would mean that real growth was even higher than reported, and the deflation even deeper. Others argue the opposite. The evidence from trade unit values, which show Chinese export prices falling substantially between 2022 and 2025, supports the view that deflationary pressure in traded goods was real and significant.

Finally, it is worth noting the trajectory of China's GDP in market dollars, shown in Figure 2.3, because it explains much of the confusion in public debate about whether China is "catching up" with the United States.



Source: IMF World Economic Outlook, October 2026

Figure 2.3. GDP in market dollars, 2000 to 2031, IMF estimates and projections (US$ trillion)

China's GDP in dollars rose from about 1.2 trillion in 2000 to 11.3 trillion in 2015 and peaked relative to the United States in 2021, at about 76 percent of the American level. It then fell back to about 64 percent in 2025, as the renminbi weakened, Chinese prices fell and American nominal growth was strong. The IMF projects China at 28.6 trillion dollars in 2031 against 40.0 trillion for the United States. In purchasing-power terms, China has been the larger economy since about 2016. Both measures are valid, for different purposes, and the gap between them is itself a measure of how cheap China remains relative to its productive capacity.

In focus: China in ratios

Ratios are the simplest way to grasp the scale of China's transformation. Table 2.2 expresses China's value for eighteen indicators as a multiple of the value for the United States in 2005, 2015 and 2024, and of the European Union, Japan and India in 2024.

Table 2.2. China in ratios: China's value as a multiple of the United States, the European Union, Japan and India

Indicator	China/US 2005	China/US 2015	China/US 2024	China/EU 2024	China/Japan 2024	China/India 2024
GDP at market exchange rates	0.18	0.62	0.64	0.96	4.47	4.98
GDP at purchasing power parity	0.51	1.02	1.31	1.33	5.70	2.46
GDP per capita at PPP	0.11	0.23	0.31	0.44	0.50	2.53
Manufacturing value added	0.43	1.51	1.86	1.66	5.90	9.42
Goods exports	0.85	1.51	1.73	0.50	5.06	8.07
High-technology exports	n.a.	3.72	3.68	0.89	8.36	15.82
Gross capital formation	0.31	1.23	1.20	1.80	6.54	5.87
Household consumption	0.11	0.35	0.38	0.73	3.37	3.52
Research spending (share of GDP x GDP at PPP)	0.27	0.74	0.98	1.52	4.27	n.a.
Researchers (per million x population)	1.04	1.26	1.77	1.39	4.27	n.a.
Resident patent applications	0.46	3.28	6.19	n.a.	7.05	26.45
Scientific and technical articles	0.43	0.93	2.16	1.67	9.66	4.09
Output per worker at PPP	0.09	0.20	0.30	0.39	0.53	1.96
Electricity use (per capita x population)	0.57	1.34	2.25	3.76	10.28	5.59
Carbon dioxide emissions	1.06	2.09	2.83	5.33	13.50	4.16
Container port throughput	n.a.	4.20	5.02	2.96	13.69	12.54
Population	4.41	4.29	4.14	3.13	11.36	0.97
Population aged 65 and over	2.87	3.01	3.39	2.08	5.60	1.99

Source: World Bank WDI; GSF calculations. A ratio above 1 means China's value is larger. EU goods exports include trade between member states. For 2024, latest available year within three years where 2024 is missing.

The table tells the story of the book in numbers. In 2005, China's economy was less than one fifth the size of the American economy at market exchange rates and half its size at purchasing power parity; by 2024 it was about two thirds and 1.3 times. China's manufacturing value added went from less than half to almost twice the American level; its goods exports from 85 percent to 1.7 times; its patent applications from less than half to more than six times; its scientific articles from less than half to more than twice. On research spending measured at purchasing power parity, China had almost caught up with the United States by 2024 and spent half as much again as the European Union.

Three ratios move far less. Household consumption in China was still less than two fifths of American consumption in 2024, less than its share of GDP would suggest, which is the statistical signature of the consumption gap described in Chapter 16. Output per worker was only 30 percent of the American level, and GDP per person 31 percent. And the ratio of China's population to that of the United States has started to fall, while the ratio of its older population has risen, a foretaste of the demographic constraint of Chapter 13.

Read together, the ratios describe an economy that has become a superpower in production, trade, research inputs, energy use and emissions, but remains a middle-income country in productivity, income and consumption. The tension between those two identities runs through every chapter that follows.

CHAPTER 3

The Decade That Changed the Question, 2015 to 2025

Key points

- In 2015 the question about China was whether it could escape the middle-income trap. By 2025 the question had become whether the rest of the world could live with Chinese industrial capacity.
- Five shocks shaped the decade: the industrial policy turn of 2015, the trade and technology war from 2018, the pandemic, the property collapse from 2021 and the export boom of the "new three."
- Each shock pushed China in the same direction: more state-directed investment in manufacturing and technology, and less reliance on property and foreign technology.
- The decade ended with a truce in the trade war, record surpluses, an energy shock and a new Five-Year Plan that doubles down on industry.

Two questions, ten years apart

In 2015, the dominant question in the international debate about China was defensive. Growth was slowing from double digits. The stock market had crashed in the summer. In August, a small devaluation of the renminbi set off a wave of capital flight that drained hundreds of billions of dollars from the central bank's reserves over the following eighteen months. Wages were rising fast and labour-intensive factories were moving to Vietnam and Bangladesh. Economists asked whether China would fall into the "middle-income trap," the fate of many economies that grow rapidly to middle-income levels and then stall before they become rich.

Ten years later, the question had been turned on its head. China's growth had slowed further, its property market had collapsed and its population was shrinking. Yet its factories were exporting more than ever, in more sophisticated products, at lower prices. The international debate was no longer about whether China could compete, but about whether its trading partners could survive its competition. American and European officials spoke of "overcapacity" and a "second China shock." The International Monetary Fund warned in February 2026 that China's large current account surplus and its weak currency were having "adverse spillovers" on its trading partners.

This chapter traces how that reversal happened. It does so through five shocks and the policy responses they produced. Table 3.1 summarises the main events.

Table 3.1. Timeline of the decade: key events shaping Chinese competitiveness, 2015 to 2026

Date	Event	Significance for competitiveness
May 2015	State Council publishes Made in China 2025	Targets ten strategic industries and domestic content goals
August 2015	Renminbi devaluation triggers capital flight	Ends the era of one-way currency appreciation
2016	Supply-side structural reform cuts steel and coal capacity	First major attempt to manage overcapacity
July 2017	New Generation Artificial Intelligence Development Plan	Sets the goal of world leadership in AI by 2030
July 2018	First United States Section 301 tariffs take effect	Start of the trade war
May 2019	Huawei added to the US Entity List	Technology controls become a central tool
January 2020	Phase One trade agreement signed	Purchase commitments largely unmet
2020	Pandemic; "dual circulation" strategy; "three red lines" for developers	Self-reliance and property deleveraging
2021	Evergrande defaults; regulatory campaign on platform companies	Start of the property collapse
October 2022	US controls on advanced chips and chipmaking tools	Access to frontier semiconductors restricted
2023	"New quality productive forces" becomes official doctrine; EU opens EV anti-subsidy probe	Priority shifts to high-tech manufacturing
October 2024	EU tariffs of up to 35.3 percent on Chinese electric cars	First major EU trade defence against the "new three"
November 2024	Ten trillion yuan programme to refinance hidden local debt	Attempt to stabilise local government finance
January 2025	DeepSeek releases its R1 reasoning model	Chinese AI reaches the frontier at low cost
April 2025	US tariffs on Chinese goods escalate to triple digits; China restricts seven rare earths	Peak of the trade war
October 2025	Trump and Xi meet in Busan; truce cuts US tariffs and suspends expanded rare earth controls	One-year truce
2025	Goods trade surplus of about 1.2 trillion dollars; record Belt and Road engagement	Export boom and outward expansion
February 2026	US Supreme Court strikes down tariffs imposed under IEEPA; temporary global tariff under Section 122	Average US tariff on Chinese goods falls from about 36 to about 25 percent on BCG estimates; Section 301 duties remain
February 2026	War with Iran closes the Strait of Hormuz to most tanker traffic	Energy shock for Asia
March 2026	15th Five-Year Plan adopted	Industrial system and technology placed first
May and September 2026	Trump visits Beijing; Xi visits Washington; truce extended and 30 billion dollars of tariff cuts agreed	Managed rivalry
November 2026	Ten-month trade surplus passes 1 trillion dollars; rare earth control suspension extended to January 2027	Imbalances persist

Source: Global Strategy Files compilation from official announcements and press reports.

Shock one: the industrial policy turn

Made in China 2025 was not the first Chinese industrial plan, but it was the first to state openly that China intended to lead the world in advanced manufacturing. It named ten sectors: next-generation information technology, robotics and advanced machine tools, aerospace, maritime equipment and ships, rail equipment, new energy vehicles, power equipment, agricultural machinery, new materials and biomedicine. It set targets for domestic market shares in key components, some as high as 70 percent by 2025.

How much of it was achieved? The answer depends on the sector. In new energy vehicles, rail equipment, power equipment, ships and many categories of machinery, China met or

exceeded its ambitions. By 2025, China produced about 16.6 million new energy vehicles, more than the rest of the world combined, and exported 2.6 million of them according to the China Association of Automobile Manufacturers. Its shipyards won 63 percent of global orders by compensated gross tonnage, according to Clarksons. Its domestic brands held almost 70 percent of the home car market. In robotics, China became the world's largest market and a significant producer, although high-end robots and their key components remained largely foreign. In aerospace and advanced semiconductors, the targets were missed by wide margins. China's large passenger jet, the C919, entered service in 2023 but relies on Western engines and avionics. In chips, the plan's goal of 70 percent self-sufficiency was not met, although domestic capacity grew rapidly.

The deeper legacy of the plan was a method. Central and local governments learned to combine guidance funds, cheap land, subsidised credit, procurement preferences and tax incentives to build entire supply chains in a few years. That method, applied first to solar panels in the 2000s and then to batteries and electric vehicles, became the template for semiconductors, robots, drones, biotechnology and artificial intelligence.

Shock two: the trade and technology war

The trade war that began in 2018 changed the strategic environment more than the trade flows. American tariffs of 7.5 to 25 percent on about two thirds of imports from China, introduced in 2018 and 2019, reduced China's share of American imports from about 16 to 17 percent at its peak to 12 percent by 2024, as shown in Chapter 12. But much of the trade was rerouted through third countries, especially Vietnam and Mexico, whose own imports from China rose sharply.

The technology war had deeper effects. The addition of Huawei to the US Entity List in 2019, the restrictions on advanced chips and chipmaking equipment of October 2022 and their successive extensions convinced China's leaders that dependence on foreign technology was a strategic vulnerability. The response was a massive programme of investment in domestic alternatives, financed by state funds, local governments and banks. The third phase of the national integrated circuit fund, announced in May 2024, alone committed 344 billion yuan.

In 2025, the trade war escalated sharply. American tariffs on Chinese goods rose to triple-digit levels in April before a truce in Geneva in May. China responded with export controls on seven medium and heavy rare earth elements, which it controls almost entirely, and in October 2025 it announced a far broader regime that would have required licences for any foreign product containing more than 0.1 percent of Chinese-origin rare earths. The meeting between Presidents Trump and Xi in Busan on 30 October 2025 produced a one-year truce: the United States cut its fentanyl-related tariff by half, bringing the average tariff on Chinese goods from about 57 to 47 percent according to President Trump, and China suspended its expanded controls until November 2026. The rare earth episode demonstrated that China's competitive position in critical inputs had become a strategic weapon.

Shock three: the pandemic

The pandemic years of 2020 to 2022 had a paradoxical effect on Chinese competitiveness. China's strict zero-COVID policy imposed heavy costs on its own households and services sector. But in 2020 and 2021, while factories elsewhere were shut, Chinese factories reopened quickly and supplied the world with medical equipment, electronics for home working and consumer goods. China's share of world manufacturing value added peaked at 30 percent in 2021 and its share of world goods exports reached almost 15 percent. Many buyers who had planned to diversify away from China after the trade war found they could not.

The end of zero-COVID in December 2022 was followed not by the consumer boom that many expected but by a weak recovery. Households that had seen their property wealth fall and their job security weaken chose to save. That set the stage for the deflationary pressures of 2023 to 2025.

Shock four: the property collapse

The property sector had been China's largest growth engine for two decades. At its peak, construction and related activities accounted for something like a quarter of GDP on broad estimates, land sales provided a large share of local government revenue, and housing represented most of household wealth. In August 2020, the authorities imposed the "three red lines" on developer borrowing, aiming to deflate a bubble before it burst. The bubble burst anyway. Evergrande defaulted in late 2021, followed by Country Garden and dozens of other developers.

By 2025, real estate investment had fallen for five consecutive years; it fell by 17 percent in 2025 alone, to 8.28 trillion yuan. New home sales had fallen by more than half from their 2021 peak. The Bank for International Settlements' index of existing home prices in seventy cities had fallen by about 22 percent from its 2021 peak by early 2026. Local governments lost a large share of their land revenue and became dependent on transfers and refinancing from Beijing, including the ten trillion yuan programme announced in November 2024.

The property collapse matters for competitiveness in two ways. Directly, it removed a source of demand that had absorbed a large share of China's investment and much of its steel, cement and glass. Indirectly, it redirected credit and policy attention. As lending to developers dried up, banks were instructed to lend to manufacturing and technology. Bank loans to industry rose rapidly from 2021, financing a wave of new factories in the very sectors where China was already strong. Some of the "overcapacity" of the mid-2020s is the mirror image of the property collapse.

Shock five: the "new three" and the export boom

The fifth shock was a positive one for China and a disruptive one for its trading partners. Between 2021 and 2025, exports of the "new three" (electric vehicles, lithium-ion batteries

and solar products) surged. China became the world's largest car exporter in 2023, overtaking Japan, and exported 7.1 million vehicles in 2025, according to the China Association of Automobile Manufacturers. Its solar manufacturers drove module prices down by more than half, and its battery makers came to dominate global supply.

From 2024, a second wave followed: chips, servers and networking equipment for the global artificial intelligence boom. In October 2026, China's semiconductor exports were up 137 percent in value on a year earlier, according to customs data, and total exports were up 35 percent. The surplus with the European Union reached 311 billion dollars in the first ten months of 2026, up from 242 billion a year earlier.

The verdict of the decade

Looking back, the five shocks share a common thread. Each one, in its own way, pushed China towards more manufacturing, more technology and more state direction, and away from property, from foreign technology and from household consumption as drivers of growth. The trade war and technology controls raised the strategic value of self-reliance. The pandemic demonstrated the resilience of Chinese supply chains. The property collapse freed credit and political attention for industry. The export boom rewarded the industrial strategy with visible success.

The result is the economy described in Chapter 2: the world's dominant manufacturer, more sophisticated than ever, but with a domestic economy that is short of demand and increasingly reliant on external markets that are becoming less welcoming. The 15th Five-Year Plan adopted in March 2026 confirms this orientation. Its first objective is a modern industrial system. It does promise to boost consumption, and it contains the first national five-year plan devoted specifically to consumption. But the balance of resources and political attention still favours production.

Whether that orientation is a strength or a weakness for the next decade is the central question of Parts III and IV. Before addressing it, Part II examines each engine of competitiveness in turn, starting with the most fundamental: where growth has actually come from.

In focus: Made in China 2025, a scorecard

How did the ten priority sectors of Made in China 2025 fare by the plan's end date? Table 3.2 offers a summary assessment, based on the evidence presented in this book and on public reporting. It is necessarily qualitative: the plan's own targets were expressed partly in terms of domestic market shares and partly in vague language about international competitiveness, and the government stopped publicising the plan after 2018.

Table 3.2. Made in China 2025: a scorecard of the ten priority sectors at the end of 2025

Sector	Outcome by 2025	Assessment
Next-generation information technology	Global leader in telecom equipment and consumer electronics; mature-node chips expanding; frontier chips blocked by controls	Mixed: strong in devices and networks, behind in advanced chips
High-end machine tools and robotics	World's largest robot market; domestic robot makers gaining share; high-end tools and components still partly imported	Substantial progress
Aerospace and aviation equipment	C919 in service with Western engines; strong in drones and space	Partly achieved, dependent on foreign engines
Maritime engineering and high-tech ships	World's largest shipbuilder; entry into LNG carriers and cruise ships	Largely achieved
Advanced rail transportation equipment	World's largest high-speed network and leading rail equipment maker	Achieved
New energy and intelligent vehicles	World's largest producer and exporter of EVs; dominant in batteries	Exceeded expectations
Power equipment	Leader in ultra-high voltage transmission, hydro, wind and solar equipment, nuclear construction	Achieved
Agricultural machinery	Large domestic industry, high-end equipment partly imported	Partial
New materials	Strong in rare earth magnets, battery materials, some advanced composites; gaps in specialty materials	Partial, with key strengths
Biomedicine and high-performance medical devices	Major ingredient supplier; rising source of new drug candidates; dependent on imports for high-end devices	Rapid progress from a low base

Source: Global Strategy Files assessment.

The pattern that emerges is consistent with the analysis of Part II. Where the key technologies were mature or could be developed through scale and engineering, as in rail, power, ships, batteries and vehicles, China succeeded spectacularly. Where the key technologies were at the scientific frontier and could be withheld by foreign governments, as in advanced semiconductors and jet engines, it fell short. Where it started from far behind but faced no technology controls, as in biomedicine, it made rapid progress.

The plan's critics abroad, notably the United States Trade Representative and the European Chamber of Commerce in China, argued from the start that its methods, particularly domestic market share targets, subsidies, and pressure on foreign firms to transfer technology, distorted competition. Those criticisms shaped the trade war and the export controls that followed. In that sense, Made in China 2025 succeeded in transforming Chinese industry and failed in its implicit assumption that the rest of the world would accept the transformation passively.

The 15th Five-Year Plan carries the same logic forward under a different name. Its emphasis on "new quality productive forces" and on a "modern industrial system" names a new generation of priority industries: integrated circuits, artificial intelligence, quantum technologies, biomanufacturing, commercial aerospace, the low-altitude economy, new materials, embodied intelligence, brain-computer interfaces, hydrogen and nuclear fusion, and sixth-generation mobile communications. The method, a combination of state guidance, local competition and massive finance, will be the same.

PART II

The Engines of the Last Ten Years

Where growth came from, what it cost, and how China turned scale into capability across costs, industry, complexity, innovation, automation, green technology, the state and trade.

CHAPTER 4

Where Growth Came From: Capital, Labour and Productivity

Key points

- Growth accounting on Penn World Table data shows that capital accumulation contributed between 3.2 and 5.4 percentage points a year to Chinese growth since 1995, more than any other factor.
- Total factor productivity growth peaked at almost 5 percent a year in 2005 to 2010 and fell to about 1.4 percent in 2019 to 2023.
- Employment has subtracted from growth since 2015. Human capital still adds a quarter to half a point a year.
- China's capital stock is now 5.5 times its annual output, a ratio slightly above Japan's and about 1.7 times the American level. Each extra unit of capital buys less growth.

The accounting question

Every discussion of competitiveness eventually comes back to productivity. In the long run, an economy can only raise wages while keeping its costs competitive if its workers produce more per hour. Productivity can grow in two ways: by giving each worker more and better equipment, which economists call capital deepening, or by using all inputs more efficiently, through better technology, organisation, management and allocation. The second component is called total factor productivity, or TFP. It is the closest thing economics has to a measure of how much an economy has learned.

Growth accounting is the standard method for separating these components. It starts from a production function, which relates output to the stock of capital, the number of workers and their skills, and asks how much of the observed growth in output can be explained by growth in each input, weighted by its share in national income. Whatever growth is left over is attributed to TFP. The method is simple and has well-known limitations: TFP is a residual that absorbs measurement errors, changes in capacity utilisation and the effects of reallocation between sectors. But it remains the best starting point for understanding where growth has come from, and it is the foundation of the projections in Chapter 19.

This chapter applies growth accounting to China using the Penn World Table 11.0, released in October 2025. The table provides consistent estimates of the real capital stock, employment, a human capital index based on years of schooling and returns to education, and the share of labour in national income, for 185 economies up to 2023. Appendix B sets out the method in detail.

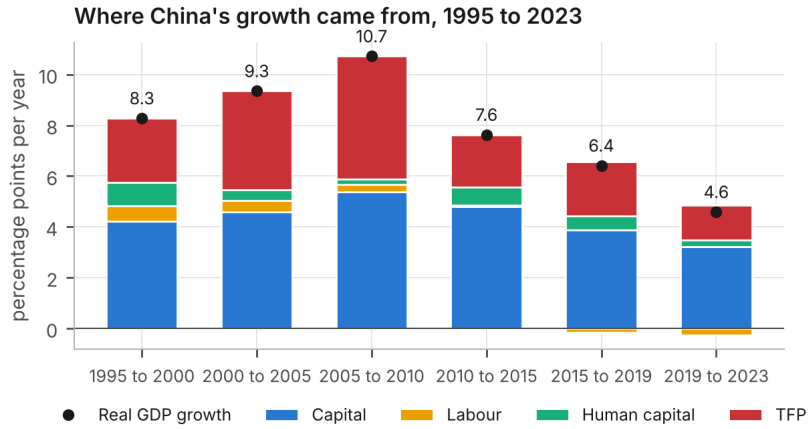
The results

Table 4.1 and Figure 4.1 present the decomposition for six periods from 1995 to 2023. In each period, the growth of real GDP is split into four parts: the contribution of capital, equal to the growth of the capital stock multiplied by the capital share of income; the contribution of employment; the contribution of human capital, measured by the growth of the schooling-based index; and the residual, TFP.

Table 4.1. Growth accounting for China, 1995 to 2023 (average annual log growth, percentage points)

Period	Real GDP growth	Capital	Employment	Human capital	TFP (residual)	Capital share
1995 to 2000	8.28	4.22	0.61	0.93	2.53	0.41
2000 to 2005	9.35	4.60	0.44	0.41	3.90	0.41
2005 to 2010	10.72	5.38	0.29	0.21	4.83	0.44
2010 to 2015	7.63	4.80	0.05	0.72	2.06	0.43
2015 to 2019	6.41	3.88	-0.16	0.55	2.15	0.42
2019 to 2023	4.59	3.23	-0.27	0.26	1.36	0.43

Source: Penn World Table 11.0 (via FRED); GSF calculations



Source: Penn World Table 11.0; GSF calculations

Figure 4.1. Growth accounting for China: contributions to real GDP growth by period, 1995 to 2023 (percentage points per year)

Four conclusions emerge.

Capital has been the largest single source of growth in every period. Its contribution rose from 4.2 points a year in the late 1990s to a peak of 5.4 points in 2005 to 2010, the years of the investment boom that followed China's entry into the World Trade Organization and the stimulus of 2008 and 2009. It has since declined, to 3.9 points in 2015 to 2019 and 3.2 points in 2019 to 2023, but it still accounts for about 70 percent of total growth. No other large economy in our sample has relied so heavily on capital accumulation for so long.

TFP growth was extraordinary in the 2000s and has since slowed sharply. In 2005 to 2010, the residual contributed almost 4.8 points a year, an exceptional figure that reflects the absorption of foreign technology, the movement of hundreds of millions of workers from

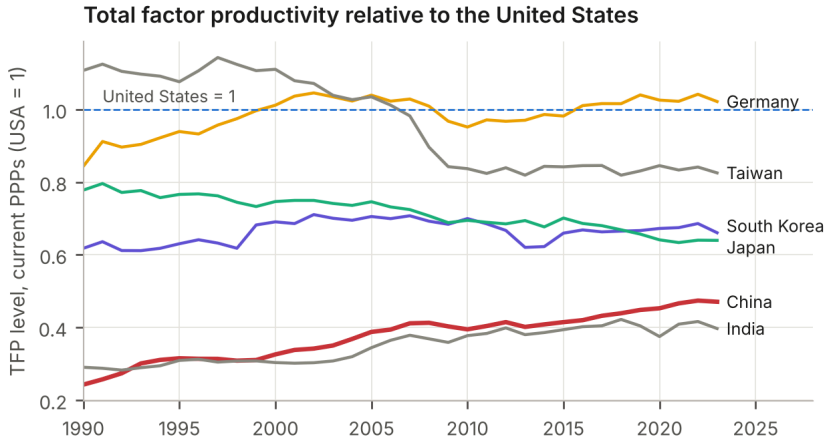
agriculture into industry, the restructuring of state enterprises and the integration of China into global supply chains. In the following decade, TFP growth fell to about 2 points a year, and in 2019 to 2023 to about 1.4 points. The pandemic years depress the last figure, but even excluding them, the trend is clearly downward.

Labour has turned from a tailwind into a headwind. Employment growth contributed about 0.6 points a year in the late 1990s, as the working-age population grew. That contribution shrank steadily and became negative after 2015, at about minus 0.2 points, and minus 0.3 points in 2019 to 2023. Employment in China, as measured by the Penn World Table, peaked around 2015 at about 775 million and has since fallen to about 750 million. With the working-age population now declining, Chapter 13 shows that this drag will intensify.

Human capital has been a steady, underestimated contributor. The schooling-based index of human capital grew by between 0.4 and 1.6 percent a year, contributing between 0.2 and 0.9 points to growth. The expansion of higher education, which raised the tertiary enrolment rate from 19 percent in 2005 to 77 percent in 2024, is only partly captured by an index based on average years of schooling, because the stock of educated workers changes slowly as new graduates replace older, less educated workers. Its effect on productivity will be felt mostly in the 2030s.

How does China's TFP compare?

The Penn World Table also estimates the level of TFP in each country relative to the United States, at current purchasing-power parities. Figure 4.2 shows the result for China and the comparison economies.



Source: Penn World Table 11.0

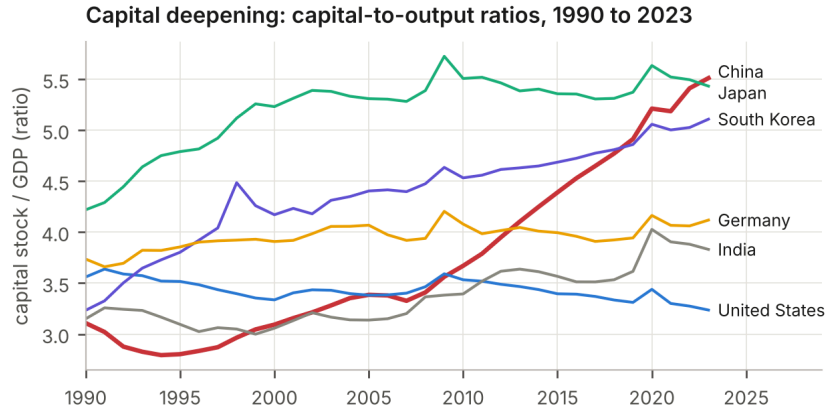
Figure 4.2. Total factor productivity relative to the United States, 1990 to 2023 (current PPPs, United States = 1)

By this measure, China's TFP was about 0.25 of the American level in 1990, 0.33 in 2000, 0.41 in 2015 and 0.47 in 2023. It has been catching up, but slowly: about 1.6 percent a year relative to the United States between 2015 and 2023. India's relative TFP is about 0.40. Japan and South Korea are at about 0.64 and 0.66 respectively, Taiwan at 0.83, and Germany slightly above the American level.

Three caveats are important. First, cross-country TFP levels depend on many assumptions, including the measurement of capital stocks and the purchasing-power parities used to convert output, and they are revised significantly between editions of the Penn World Table. Second, economy-wide TFP averages very different sectors. China's leading manufacturers in electronics, batteries, telecommunications equipment or shipbuilding are probably close to the global productivity frontier, while its agriculture, many services and much of its state sector lag far behind. Third, a low relative TFP is in one sense good news: it means there is still a large gap to close, and closing it is the main source of potential growth for the next decade.

The rising cost of growth

The other side of China's capital-intensive growth is a rising capital-to-output ratio. Figure 4.3 shows the ratio of the real capital stock to real GDP, both at constant national prices, for China and the comparison economies.



Source: Penn World Table 11.0; GSF calculations

Figure 4.3. Capital-to-output ratios, 1990 to 2023

China's ratio rose from 2.8 in 1995 to 3.4 in 2005, 4.4 in 2015 and 5.5 in 2023. It is now slightly above Japan's, which reached a similar level after decades of heavy investment, and about 1.7 times the level of the United States, where the ratio has drifted down to just over three. South Korea's ratio has risen too, to about five.

A rising capital-to-output ratio is not in itself a problem. Economies that are catching up typically accumulate capital faster than output for a long time, because their capital stock

starts low and their workers need more equipment. But a ratio of 5.5 at China's income level is unusual, and it has two consequences.

The first is diminishing returns. With a capital share of about 0.43, the marginal product of capital, before depreciation, is roughly the capital share divided by the capital-output ratio: about 8 percent at a ratio of 5.5, compared with about 12 percent at a ratio of 3.5. After a depreciation rate of 5 to 6 percent, the net return on the marginal unit of investment becomes thin. That is a central reason why returns on assets in Chinese industry have fallen and why many local infrastructure projects do not generate enough revenue to repay their debts.

The second is the rising weight of depreciation. A larger capital stock requires more investment just to maintain it. If China wanted to keep its capital stock growing at 7 percent a year, as it did in 2023, while depreciating 5.5 percent of it, it would need gross investment equal to about 12.5 percent of the capital stock, or about 69 percent of GDP in the constant-price units of the Penn World Table. That is the arithmetic behind the model results of Chapter 19: as investment as a share of GDP drifts down, the growth of the capital stock must slow, and so must the contribution of capital to growth.

Interpreting the slowdown in TFP

Why has TFP growth slowed so much since 2010? Five explanations are commonly offered, and the evidence suggests that all of them play a role.

The end of easy reallocation. Much of China's productivity growth in the 1990s and 2000s came from moving workers from low-productivity agriculture to higher-productivity industry and services. Agriculture's share of employment fell from about half in 2000 to about a fifth in 2025. The remaining rural workforce is older and less mobile, so the gains from further reallocation are smaller.

The narrowing technology gap in leading sectors. In industries where Chinese firms are now at the frontier, they can no longer grow productivity by adopting foreign technology. They must invent, which is slower and more expensive.

Misallocation of capital. A growing body of research finds that capital in China is allocated with a strong bias towards state enterprises and local government projects, whose returns are lower than those of private firms. The rise of state-directed investment after 2015, and the tightening of control over the private sector after 2020, may have increased misallocation.

Excess capacity. When capacity grows faster than demand, utilisation falls and measured TFP falls with it. Part of the decline in TFP after 2015 reflects underused factories and infrastructure rather than a fall in underlying technological progress.

Measurement. Official deflators may understate quality improvements in new products, which would bias real output and TFP growth downwards, while overstated GDP growth in some years would bias them upwards. The net effect is uncertain. Some independent esti-

mates of Chinese TFP growth since 2010 are close to zero; the Penn World Table figures used here are more favourable.

What it means for competitiveness

The growth accounting results contain a message that will recur throughout the book. China's competitive gains of the last decade were real, but they were bought with very large investment. Each point of growth now requires more capital than at any time in China's modern history, and more than in most comparable economies at a similar stage. That is sustainable only if TFP growth stays high enough to keep returns on capital positive, or if investment can be redirected to higher-return uses.

For China's trading partners, the implication is less comfortable. An economy that invests 40 percent of its output in capital, much of it in manufacturing, while its domestic demand grows slowly, will produce more than it can absorb at home. The surplus has to go somewhere. That is the mechanism behind the trade tensions of the mid-2020s, and it will not disappear unless China's investment rate falls or its consumption rate rises substantially. Chapters 14 and 16 examine whether either is likely.

In focus: what if growth has been overstated?

Because growth accounting treats TFP as a residual, any error in measured output growth passes directly into the estimate of productivity. If official GDP growth has been overstated, TFP growth is overstated by the same amount. This box examines how sensitive the conclusions of this chapter are to that possibility.

Suppose that true growth between 2015 and 2023 was one point a year lower than the Penn World Table figure, which is based on official data. Average annual GDP growth would then have been about 5.4 percent in 2015 to 2019 and 3.6 percent in 2019 to 2023. Capital and labour contributions would be unchanged, because they are measured independently. TFP growth would fall from 2.1 to about 1.1 percent a year in 2015 to 2019, and from 1.4 to about 0.4 percent in 2019 to 2023. The capital-to-output ratio in 2023 would be about 6.0 rather than 5.5.

Under this alternative, the conclusions of the chapter would become sharper. China's productivity engine would have slowed even more, its reliance on capital accumulation would be even greater, and the efficiency of its investment even lower. The projections of Chapter 19, which assume long-run TFP growth of 1.5 percent a year on average, would be too optimistic, and median growth in 2031 to 2035 would be closer to 2 percent than to 2.7 percent.

There are also reasons to think that measured TFP may understate true productivity growth. Official price indices may not fully capture quality improvements in rapidly evolving products such as smartphones, electric vehicles and software. The shift of output towards new products with falling prices may be poorly measured. And the large investments in research, data and software that Chinese firms have made in recent years may be

only partly counted as capital, which would lead to an underestimate of capital and an overestimate of TFP, or vice versa depending on the treatment.

The most reasonable conclusion is that TFP growth since 2015 has probably been somewhere between 1 and 2 percent a year, with a downward trend. That range is reflected in the distribution assumed for the projections in Chapter 19.

In focus: productivity inside Chinese industry

Aggregate TFP hides enormous differences among firms and sectors. Research using firm-level data from the Chinese industrial census and listed company accounts consistently finds three patterns.

The first is the gap between private and state-owned firms. Private firms in Chinese manufacturing have higher productivity and higher returns on assets than state-owned firms in the same industries, often by large margins, yet state-owned firms receive a disproportionate share of bank credit. Studies in the tradition of the work of Chang-Tai Hsieh and Peter Klenow on misallocation estimate that equalising the marginal returns to capital across Chinese firms could raise aggregate manufacturing TFP by a substantial amount, several tens of percent in some estimates.

The second is the dispersion within industries. In every sector, from cars to solar, a small number of highly productive firms coexist with a long tail of weak firms kept alive by local government support, cheap credit or protected local markets. The anti-involution campaign of 2025 is, in part, an attempt to accelerate the exit of that tail.

The third is the rise of frontier firms. A growing number of Chinese firms, including CATL in batteries, BYD in vehicles, Huawei in telecommunications, DJI in drones, LONGi and Jinko in solar, and several shipbuilders and machinery makers, operate at or near the global productivity frontier. Their performance is not captured by aggregate statistics, but it is what foreign competitors face in world markets.

For the future, these patterns suggest that China's productivity potential is larger than its aggregate TFP trend implies. If capital could be reallocated from weak to strong firms, and from state to private uses, aggregate productivity could rise significantly without any new technology. That is one reason why reforms of the financial system and of local government incentives matter so much for China's growth prospects.

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2.7%
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1.5%
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16.5%
estimated ceiling of China's share of world goods exports

46%
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