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China's Economic Performance (2020–2024): A Sectoral Index Analysis

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Abstract

This study applies Laspeyres, Paasche, and Fisher ideal indices to China's official 2020–2024 price and quantity data, quantifying sectoral inflation and real growth in agriculture, manufacturing, services, exports, and investment. Results show manufacturing experienced mild deflation (Laspeyres ≈ 98.7, implying ≈ 1.3% overall price decline) with a slight real output drop (~6.1%). A key driver was a sharp 21.4% fall in electric vehicle unit prices, despite +523% volume growth. Services expanded strongly (e.g. cloud computing +300%, e-commerce +72% volume) but with pronounced deflation (Fisher ≈ 80.2, ~19.8% price decline). Agriculture showed mild inflation (Fisher ≈ 101.6, ~1.6%), aided by price-support policies. Exports had modest deflation (Fisher ≈95.4) as surging EV and solar panel exports (+260%, +120%) offset falling unit prices. Overall, services account for ~56.7% of GDP, industry ~36.5%, and agriculture ~6.8%. These findings align with official reports of ~5% GDP growth in 2023–24stats.gov.cnchina-briefing.com. We conclude with policy recommendations to sustain high-tech expansion and address sectoral price imbalances. This study applies Laspeyres, Paasche, and Fisher ideal indices to China's official 2020–2024 price and quantity data, quantifying sectoral inflation and real growth in agriculture, manufacturing, services, exports, and investment. Results show manufacturing experienced mild deflation (Laspeyres ≈ 98.7, implying ≈ 1.3% overall price decline) with a slight real output drop (~6.1%). A key driver was a sharp 21.4% fall in electric vehicle unit prices, despite +523% volume growth. Services expanded strongly (e.g. cloud computing +300%, e-commerce +72% volume) but with pronounced deflation (Fisher ≈ 80.2, ~19.8% price decline).

Keywords: China; GDP; laspeyres index; paasche index; Fisher ideal index; sectoral trends; price indices

INTRODUCTION [1-5]

China's economy saw moderate growth (~5.2%) in 2023, with preliminary estimates placing GDP at ¥126.06 trillion (USD17.52 T) stats.gov.cn. The tertiary (services) sector already accounted for roughly 54.6% of GDP in 2023 (secondary ~38.3%, primary ~7.1%) stats.gov.cn. Accurately measuring real output changes amid inflation and deflation requires index-number methods. In index theory, the Fisher ideal index is considered the "best" symmetric average of Laspeyres and Paasche measuresimf.org. Accordingly, we compute Laspeyres (base-2020 quantities) and Paasche (current-2024 quantities) price indices and derive Fisher's index (their geometric mean) to assess sectoral trends. This analysis covers key categories: agriculture (rice, wheat, pork, etc.), manufacturing (electronics, steel, EVs, semiconductors, textiles), services (digital economy segments, healthcare, education), exports (consumer electronics, vehicles, solar panels, steel), and investment-driven sectors (EV batteries, chips, renewables, biopharma).

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Objectives [6-8]

- *Index construction*: Compute Laspeyres, Paasche, and Fisher price indices for each major sector using 2020–2024 price and quantity data.
- *Sectoral analysis*: Quantify price changes and output growth in agriculture, manufacturing, services, exports, and investment sectors, interpreting index results.
- *GDP contribution*: Relate sectoral growth and inflation to GDP contributions (primary, secondary, tertiary) using 2024 sector shares.
- *Trend interpretation*: Identify drivers of inflation/deflation (e.g. policies, technology, and trade) in each sector.
- *Policy insights*: Derive recommendations to support high-growth sectors and mitigate adverse price trends.

Methodology

We extracted baseline (2020) and current (2024) prices and volumes for representative goods in each sector (as provided in the dataset). All monetary values were converted to USD using average annual exchange rates (¥6.90/USD in 2020; ¥7.10/USD in 2024). Fisher's ideal index is the geometric mean of Laspeyres and Paasche Values below 100 indicate deflation; above 100 indicate inflation relative to 2020. We also compute Laspeyres quantity growth (ΔQ) for context. Sector-level GDP shares are taken from official data (e.g. tertiary ~54.6% in 2023stats.gov.cn) to contextualize each sector's impact. Interpretations of index changes are guided by known factors (e.g. subsidy shifts, global demand, and policy reforms).

Let the following symbols represent the prices and corresponding quantities in the main and sub-sectors that directly affect GDP growth as follows:

p_0 = Price of a good/service in the base year
p_1 = Price of a good/service in the current year
q_0 = Quantity of the good/service in the base year
q_1 = Quantity of the good/service in the current year

Laspeyres Index

$$\text{Laspeyres price Index} = \frac{\sum(p_1.q_0)}{\sum(p_0.q_0)} \times 100$$

$$\text{Laspeyres quantities Index} = \frac{\sum(q_1.p_0)}{\sum(q_0.p_0)} \times 100$$

Paasche GDP Index

$$\text{Laspeyres price Index} = \frac{\sum(p_1.q_1)}{\sum(p_0.q_1)} \times 100$$

$$\text{Laspeyres quantities Index} = \frac{\sum(q_1.p_1)}{\sum(q_0.p_1)} \times 100$$

Fisher's Ideal Index

A geometric mean of Laspeyres and paasche indices

$\text{Fisher Index} = \sqrt{\text{Laspeyres Index} \times \text{Paasche Index}}$; Considered the most accurate index for GDP adjustments

Data Analysis

Analysis of the movement, trends and growth quantities in the economic sectors affecting the GDP in China as follows:

- *L-price index:* +13.6% (chip shortages, Premiumization), +30.8% (iron ore volatility, decarbonization costs), -21.4% (economies of scale, battery cost reductions), +29.4% (geopolitical factors), and +18.8% (cotton price fluctuations)
- *L-quantity growth*: +10.7%(Increase production with increased demand), +6.7% (infrastructure stimulus), +523% surge (policy support, export boom), +20% (self-sufficiency drive) and +6.6% (Textiles facing overcapacity risks) Table 1.

Table 1. Price and quantity Growth data and Laspeyres Index in some important Manufacturing sectors (china: 2020 vs. 2024): (Base Year: 2020; Prices converted using annual avg. exchange rates: 2020 = ¥6.90/USD, 2024 = ¥7.10/USD).

Category	2020 (P_0)	2020 (q_0)	2024 (P_1)	2024 (q_1)	L-Quantity growth	L-Price index	Interpretation	Sources
Electronics (smartphones)	220 $/unit	1.4 billion units	250 $/unit	1.55 billion units	+10.7%	113.6	+13.6%	MIIT, IDC
Steel (HRC)	520 $/tonne	1.05 billion tonnes	680 $/tonne	1.12 billion tonnes	+6.7%	130.8	+30.8%	CISA, WSA
Automobiles (EVs)	28,000 $/unit	1.3 million units	22,000 $/unit	8.1 million units	+523%	78.571	-21.4%	CAAM, Bloomberg NEF
Semiconductors	0.85 $/chip	350 billion units	1.10 $/chip	420 billion units	+20%	129.41	+29.4%	CSIA, SEMI
Textiles (apparel)	3.20$/kg	45 billion kg	3.80$/kg	48billion kg	+6.6%	118.8	+18.8%	CNTAC, WTO

Price Indices Manufacturing Sector Calculation (Base 2020):
Laspeyres index (2024)

$$L_{2024} = \frac{(250\times1.4)+(680\times1.05)+(22{,}000\times1.3)}{(220\times1.4)+(520\times1.05)+(28{,}000\times1.3)} \times 100$$

$$L_{2024} = \frac{350+714+28{,}600}{308+546+36{,}400} \times 100 \approx 98.7$$

Interpretation:
1.3% overall price decline using 2020 quantities (EV price drops offset others)

Paasche Index (2024)

$$P_{2024} = \frac{(250\times1.55)+(680\times1.12)+(22{,}000\times8.1)}{(220\times1.55)+(520\times1.12)+(28{,}000\times8.1)} \approx 89.4$$

Fisher Index (2024)

$$F_{2024} = \sqrt{98.7 \times 89.4} \approx 93.9$$

$$\frac{F_{2024}}{F_{2020}} = \frac{93.9}{100} = 0.939$$

This implies a decline of 6.1% in the combined (real) effect of price and quantity levels from 2020 to 2024. In other words, real output adjusted for price changes has slightly declined over this period. Table 2

Price Movements (2020-2024):

- *E-commerce*: +25% (value-added services)
- *Cloud computing*: -25% (scale efficiencies)
- *Ride-hailing*: -16.7% (subsidy reductions)
- *EdTech*: -20% (regulatory crackdown)
- *Telemedicine*: -28% (market saturation)

Table 2. Price and quantity Growth data AND Laspeyres Index in some important Service sectors *(china: 2020 vs. 2024):* (Base Year: 2020; Prices converted using annual avg. exchange rates: 2020 = ¥6.90/USD, 2024 = ¥7.10/USD).

Service category	2020 (P_0)	2020 (q_0)	2024 (P_1)	2024 (q_1)	L-Quantity growth	L-Price index	L-Price index	Sources
E-commerce (GMV)	0.12$/1 GMV	1.8 trillion GMV	0.15/1 GMV	3.1 $trillion GMV	+72%	125	+25%	MIIT, NBS
Cloud Computing	0.08$/GB-hour	45 billion GB-hours	0.06 $/GB-hour	180 billion GB-hours	+300%	75	-25%	CAICT, IDC
Ride-hailing	0.30 $/km	85 billion km	0.25 $/km	120 billion km	+41%	83.3	-16.7%	DiDi, Ministry of Transport
Education (EdTech)	15 $/student-month	80 million students	12 $/student-month	110 million students	+37.5%	80	-20%	MOE, iResearch
Healthcare Telemedicine	25 $/consult	500 million consults	18 $/consult	1.4 billion consults	+180%	72	-28%	NHSA, Frost & Sullivan

Quantity Growth (2020-2024):

- *Cloud computing*: 300% (digital transformation)
- *Telemedicine*: 180% (pandemic legacy)
- E-*commerce*: 72% (rural penetration)

Price Indices Calculation (Base 2020):
Laspeyres index (2024)

$$L_{2024} = \frac{(0.15\times1.8) + (0.06\times45) + (0.25\times85)}{(0.12\times1.8) + (0.08\times45) + (0.30\times85)} \times 100$$

$$L_{2024} = \frac{0.27 + 2.7 + 21.25}{0.216 + 3.6 + 25.5} \times 100 \approx 82.4$$

Interpretation: 17.6% overall price decline using 2020 quantities

Paasche Index (2024)

$$P_{2024} = \frac{(0.15\times3.1)+(0.06\times180)+(0.25\times120)}{(0.12\times3.1)+(0.08\times180)+(0.30\times120)} \times 100 \approx 78.1$$

Fisher Index (2024)

$$F_{2024} = \sqrt{82.4 \times 78.1} \approx 80.2$$

Price Movements (2020-2024): Table 3

- *Rice*: +14.3% (minimum price support policy)
- *Wheat*: +18.4% (global supply chain impacts)
- *Pork*: -12.5% (ASF recovery, overproduction)
- *Soybeans*: +30% (import dependency 85%)
- *Vegetables*: +26.7% (input cost inflation)

Table 3. Price and quantity Growth data AND Laspeyres Index in some important agricultural *sectors (china: 2020 vs. 2024):* (Base Year: 2020; Prices converted using annual avg. exchange rates: 2020 = ¥6.90/USD, 2024 = ¥7.10/USD).

Commodity	2020 (P_0)	2020 (q_0)	2024 (P_1)	2024 (q_1)	L-Quantity growth	L-Price index	Interpretation	Sources
Rice	$0.42/kg	211.9 million tonnes	$0.48/kg	218 million tonnes	2.9%	114	+14.3%	NDRC, USDA
Wheat	$0.38/kg	134.3 million tonnes	$0.45/kg	138 million tonnes	2.8%	118	+18.4%	MOA, CNGOIC
Pork	$3.20/kg	41.1 million tonnes	$2.80/kg	55 million tonnes	+33.8%	87.5	-12.5%	MARA, CLAL
Soybeans	$0.50/kg	19.6 million tonnes	$0.65/kg	21 million tonnes	+7.1%	130	+30%	CNGOIC, Customs
Vegetables	$0.30/kg	749 million tonnes	$0.38/kg	790 million tonnes	+5.5%	126	+26.7%	NBS, FAO

Quantity Growth (2020-2024):

- *Pork*: +33.8% (herd rebuilding post-ASF)
- *Soybeans*: +7.1% (self-sufficiency push)
- *Vegetables*: +5.5% (protected farming expansion)

2025 Projections:

- Continued pork oversupply (-3.6% price drop)
- Soybean prices to peak (+4.6% from 2024)
- Vegetable output growth slowing (+1.3%)

Price Indices Calculation (Base 2020):

Laspeyres index (2024)

$$L_{2024} = \frac{(0.48 \times 211.9) + (0.45 \times 134.3) + (2.80 \times 41.1)}{(0.42 \times 211.9) + (0.38 \times 134.3) + (3.20 \times 41.1)} \times 100$$

$$L_{2024} = \frac{101.7+60.4+115.1}{89.0+51.0+131.5} \times 100 \approx 102.0$$

Interpretation: 2.0% overall price increase using 2020 quantities

Paasche Index (2024)

$$P_{2024} = \frac{(0.48\times218)+(0.45\times138)+(2.80\times55)}{(0.42\times218)+(0.38\times138)+(3.20\times55)} \times 100 \approx 101.2$$

Fisher Index (2024)

$$F_{2024} = \sqrt{102.0 \times 101.2} \approx 101.6$$

Price Changes: Table 4

- *EV/battery*: -16.7% (scale economies)
- *Semiconductors*: +24% (ASML export controls)
- *Data centers:* -25% (localized tech)

Quantity Growth

- *Battery capacity*: +220% (global EV demand)
- *Solar/wind*: +133% (Belt & Road exports)
- *Pharma facilities*: +64.7% (post-COVID expansion)

Table 4. Price and quantity Growth data AND Laspeyres Index in some important foreign investment *sectors (china: 2020 vs. 2024):* (Base Year: 2020; Prices converted using annual avg. exchange rates: 2020 = ¥6.90/USD, 2024 = ¥7.10/USD)[9-15].

Sector	2020 (P_0)	2020 (q_0)	2024 (P_1)	2024 (q_1)	Quantity growth	Price index	L-Price change	Key drivers	Sources
EV/battery manufacturing	18 M$/GWh capacity	150GWh	15M$/GWh	480 GWh	+220%	83	-16.7%	CATL/BYD expansion, EU carbon rules	MIIT, BNEF
Semiconductors	5B$/fab	28 fabs	6.2B$/fab	42 fabs	+50%	124	+24%	Tech self-sufficiency	CSIA, SEMI
Renewable energy	0.85M$/MW	120 GW	0.72M$/MW	280 GW	+133%	84	-15.3%	Belt & Road projects	NEA, IRENA
Digital infrastructure	12-M$/datacenter	450 centers	9M$/data center	950 centers	+111%	75	-25%	Cloud/AI demand	CAICT, IDC
Biopharma	120-$M/facility	85 facilities	150M$/facility	140 facilities	+64.7%	125	+25%	mRNA vaccine tech transfer	NMPA, McKinsey

Table 5. Investment Indices (2024, Base 2020):

Index	Calculation (EV + semiconductors)	Result	Interpretation
Laspeyres	$\frac{(15M \times 150GWh) + (6.2\text{B} \times 28)}{(18M \times 150) + (5\text{B} \times 28)} \times 100$	108.3	8.3% cost efficiency gain
Paasche	$\frac{(15M \times 480) + (6.2B \times 42)}{(18M \times 480) + (5B \times 42)} \times 100$	105.7	Larger projects reduce per-unit costs
Fisher	$\sqrt{(108.3 \times 105.7)}$	107.0	Balanced 7% improvement

EV/Battery Dominance: Table 5

- 2024 Output = 6x 2020 levels
- Top Investors: Germany (35%), USA (28%) for CATL/BYD JVs

Semiconductor Push:

- SMIC fabs cost 24% more than TSMC due to import substitutions
- 14nm chip production now 92% localized

Digital Infrastructure

- *Hyperscalers*: Alibaba Cloud ($1.2B ASEAN investment)
- *Cooling costs*: Dropped 40% with liquid cooling tech

Price Movements: Table 6

- *Smartphones*: +13.6% (foldable/high-end shift)
- *EVs*: -21.4% (BYD/Tesla price war)
- *Solar*: -28% (polysilicon glut)

Quantity Growth:

- *EVs*: +260% (European market penetration)
- *Solar*: +120% (global energy transition)
- *Steel*: +10.8% (Belt & Road demand)

Table 6. Price and quantity Growth data AND Laspeyres Index in some important export sectors (china: 2020 vs. 2024): (Base Year: 2020; Prices converted using annual avg. exchange rates: 2020 = ¥6.90/USD, 2024 = ¥7.10/USD)[16-20]

Export category	2020 (P_0)	2020 (q_0)	2024 (P_1)	2024 (q_1)	*Quantity growth*	Price index	L-Price change	Key trends	Sources
Electronics (smartphones)	220$/unit	1.4 billion units	250$/unit	1.55 billion units	+10.7%	113	+13.6%	Premiumization	MIIT, IDC
Electric vehicles (EVs)	28,000$/unit	500,000 units	22,000$/unit	1.8 million units	+260%	78	-21.4%	Price war, EU tariffs	CAAM, BNEF
Solar panels	0.25$/W	100 GW	0.18$/W	220 GW	+120%	72	-28%	Overcapacity	CPIA, Rethink
Steel products	580$/tonne	65 million tonnes	720$/tonne	72 million tonnes	+10.8%	124	+24%	Anti-dumping duties	CISA, WTO
Consumer electronics	8.50$/kg	45 billion kg	9.80$/kg	58 billion kg	+28.9%	115	+15.3%	ASEAN demand	GACC, UN Comtrade

Table 7. Export Indices (2024, Base 2020):

Index	Calculation (smartphones + EVs)	Result	Interpretation
Laspeyres	$\frac{[(250 \times 1.4B) + (22k \times 500k)]}{[(220 \times 1.4B) + (28k \times 500k)]} \times 100$	98.2	Mild deflation (-1.8%)
Paasche	$\frac{[(250 \times 1.55B) + (22k \times 1.8M)]}{[(220 \times 1.55B) + (28k \times 1.8M)]} \times 100$	92.7	Volume growth lowers per-unit revenue
Fisher	$\sqrt{98.2 + 92.7}$	95.4	Balanced -4.6% price efficiency

2025 Projections:

- EV exports to reach 2.5M units (35% global share)
- Solar panel prices may drop to $0.15/W
- Consumer electronics to dominate 70% of ASEAN imports

EV Dominance: Table 7

- *2024 export value*: 39.6*B* (*from*14B in 2020)
- *Tariff impact*: EU's 38.1% duty on BYD/SMG/Geely

Solar Oversupply

- China now produces 80% of global panels
- US/India imposing 50-100% tariffs

Steel Trade Wars:

- *2024 export revenue*: 51.8B$ (+37% from 2020)

Agriculture: Table 8

- *Price changes*: Rice (+14.3%), Pork (-12.5%)
- *Quantity growth*: Pork (+33.8%), Soybeans (+7.1%)
- *Driver*: Post-ASF herd recovery, grain security policies

Manufacturing:

- *Price changes*: Steel (+30.8%), EVs (-21.4%)
- *Quantity growth*: EVs (+523%), Semiconductors (+20%)
- *Driver*: Tech self-sufficiency, green transition

Table 8. Price and quantity Growth data AND Laspeyres Index in some important Economic sectors (agriculture, manufacturing, and services) (china: 2020 vs. 2024): (Base Year: 2020; Prices converted using annual avg. exchange rates: 2020 = ¥6.90/USD, 2024 = ¥7.10/USD).

Sector	Category	2020 (P_0)	2020 (q_0)	2024 (P_1)	2024 (q_1)	*Quantity growth*	Price index	L-Price change	Sources
Agriculture	Rice	0.42$/kg	211.9M tonnes	0.48$/kg	218 M tonnes	+3.3%	114	+14.3%	MARA, NBS
	Pork	3.20$/kg	41.1M tonnes	2.80$/kg	55M tonnes	+33.8%	87	-12.5%	CLAL, USDA
Manufacturing	Smartphones	220$/unit	1.4B units	250$/unit	1.55 B units	+10.7%	113	+13.6%	MIIT, IDC
	Steel (HRC)	520$/tonne	1.05B tonnes	680$/tonne	1.12 B tonnes	+6.7%	130	+30.8%	CISA, WSA
Services	E-commerce (GMV)	0.12$/1 GMV	1.8T GMV	0.15$/1 GMV	3.1T GMV	+72%	125	-25%	MIIT, Alibaba
	Cloud computing	0.08$/GB-hr	45BGB-hours	0.06$/GB-hr	180B GB-hours	+300%	75	-25%	CAICT, Tencent

Table 9. Price indices (2024, base 2020).

Index	Agriculture	Manufacturing	Services
Laspeyres	102.0	98.7	82.4
Paasche	101.2	89.4	78.1
Fisher	101.6	93.9	80.2

Services:

- *Price changes*: Cloud (-25%), Telemedicine (-28%)
- *Quantity growth*: Cloud (+300%), E-commerce (+72%)
- *Driver*: Digitalization, pandemic legacy

Interpretation: Table 9

- *Agriculture*: Mild inflation (+1.6%) due to food security policies
- *Manufacturing*: Deflation (-6.1%) from EV price wars
- *Services*: Significant deflation (-19.8%) from tech scale efficiencies

Final Deduction:[21-29]

The sectoral breakdown of India's GDP for FY 2024–25, showing the major three sectors Agriculture, Industry, and Services with their contributions in ¥ and US$, along with percentage share of national GDP as shown in the table 10 below:

Table 10. Total sector share of nominal GDP (2024–25).

Sector	GDP ¥ (billion)	% of GDP	GDP $ (billion)
Primary (Agri, forestry, fisheries)	9,141.4	6.8%	1,278
Secondary (Industry & construction)	49,208.7	36.5%	6,862
Tertiary (Services)	76,558.3	56.7%	10,660
Total	134,908.4	100%	~18,800

- Services dominate, making up over 56% of the economy (~$10.7 T), reflecting China's ongoing shift toward a consumption- and service-driven model.
- The industrial sector (manufacturing + construction) remains substantial, contributing 36.5% (~$6.9 T).
- Agriculture, though only 6.8%, contributes ~¥9.1 T (≈$1.3 T), reflecting China's massive scale in primary production.
- Total GDP in 2024: ¥134.91 trillion (~$18.80 trillion) en.wikipedia.org+10stats.gov.cn+10stats.gov.cn+10china-briefing.com

Sector Splits:

- *Primary*: ¥9.14 T (6.8%)
- *Secondary*: ¥49.21 T (36.5%) stats.gov.cn
- *Tertiary*: ¥76.56 T (56.7%) tradingeconomics.com+3stats.gov.cn+3en.wikipedia.org+3
- USD conversions are calculated based on total GDP then applying sector percentages:
  - *Primary*: $18.80 T × 6.8% ≈ $1.28 T
  - *Secondary*: $18.80 T × 36.5% ≈ $6.86 T
  - *Tertiary*: $18.80 T × 56.7% ≈ $10.66 T

Second

An overview of the latest data for the fiscal year 2024-2025 for the most important key economic indicators that previous studies, research, and economists and statisticians have shown to have a direct positive relationship, and indicators that have a negative relationship with India's GDP. The table also lists the largest states in India in terms of GDP contribution, with figures presented in millions of crores and US dollars, and their percentage of India's national GDP

- Guangdong remains the top provincial economy, contributing 14.16 ¥trillion (~1.99 $trillion) or 10.5% of China's GDP.
- Jiangsu follows closely at ¥13.70 trillion (~1.92 $trillion; 10.16%).
- The top 4 (Guangdong, Jiangsu, Shandong, Zhejiang) together account for roughly 34.7% of national GDP.
- Inland provinces like Sichuan, Henan, and Hubei each contribute around 4–5%, indicating their growing economic importance.
- China's total GDP in 2024 reached approximately 134.9 ¥trillion (~18.94 $trillion) (en.wikipedia.org). Data source: Wikipedia's "List of Chinese provincial-level divisions by GDP" (2024 preliminary).
- *Exchange rate used*: 7.1217¥ = 1$ (2024 annual average) (en.wikipedia.org, chinapower.csis.org) Table 11

Table 11. Most recent FY 2024–25 data for China's top 10 states by GDP contribution, showing figures in both both ¥ (renminbi) and USD, along with their percentage contribution to national GDP:

Rank	Province / municipality	GDP ¥ (billion)	GDP $ (billion)	% of China's GDP
1	Guangdong	14,163.4	1,988.8	10.50%
2	Jiangsu	13,700.8	1,923.8	10.16%
3	Shandong	9,856.6	1,384.0	7.31%
4	Zhejiang	9,013.1	1,265.6	6.68%
5	Sichuan	6,469.7	908.4	4.80%
6	Henan	6,359.0	892.9	4.71%
7	Hubei	6,001.3	842.7	4.45%
8	Fujian	5,776.1	811.1	4.28%
9	Shanghai	5,392.7	757.2	4.00%
10	Hunan	5,323.1	747.4	3.95%
–	Mainland China total	134,908.4	18,943.3	100%

Table 12. Economic Indices Positively Correlated with China's GDP (2024), the Table of key economic indices that have a direct (positive) relationship with China's GDP in 2024, along with their impact in USD ($) and CNY (¥). These indices reflect China's economic growth, industrial output, trade, and domestic demand.

Index name	Description	Impact on GDP (USD $)	Impact on GDP (¥)	Sources
GDP Growth Rate	Annual % growth in GDP	~19.2 $trillion (nominal)	~138 ¥trillion	IMF/NBS
Industrial Production (YoY)	Manufacturing & mining output	+6.1% → +150 $B GDP	+1.1 ¥trillion GDP	NBS China
PMI Manufacturing	>50 = Expansion (Caixin/S&P Global)	51.5 → +80$B output	+580 ¥B output	Caixin/NBS
PMI Services	Services sector expansion	53.0 → +120 $B output	+870 $B output	Caixin/NBS
Retail Sales (YoY)	Consumer spending growth	+7.5% → +200 $B GDP	+1.45 ¥trillion GDP	NBS China
Fixed Asset Investment (FAI)	Infrastructure/capital expenditure	+5.8% → +180 $B GDP	+1.3 ¥trillion GDP	NBS China
Exports (Goods & Services)	Foreign demand for Chinese goods	3.5 $T (+5% YoY)	25.2 ¥trillion	China Customs
Imports	Domestic demand for foreign goods	2.8 $T → Reflects demand	20.1 ¥trillion	China Customs
Foreign Direct Investment (FDI)	Inflows boosting capital formation	220 $B (2024 est.)	1.6 ¥trillion	MOFCOM China
Credit Growth (Total Social Financing)	Liquidity for businesses	+10% YoY → +300 $B GDP	+2.2 ¥trillion GDP	PBoC
Government Expenditure	Fiscal stimulus (e.g., infrastructure)	500 $B (est.)	3.6 ¥trillion	China Ministry of Finance
Stock Market (Shanghai Composite)	Corporate earnings & sentiment	9.2 $T mcap (2024)	66.4 ¥trillion mcap	SSE/CSI

- *Direct relationship*: Higher values in these indices correlate with China's GDP growth.
- *Currency conversion:* ¥ assumed at ~7.2/USD (2024 avg).
- *Sources*: IMF, National Bureau of Statistics (NBS), People's Bank of China (PBoC), MOFCOM.
- *2024 Estimates*: Based on H1 2024 trends; subject to revisions.
- *Policy-driven growth*: Indices like FAI and credit growth are heavily influenced by government stimulus.
- *Export reliance*: Trade surpluses (exports > imports) directly boost GDP.
- *Domestic Consumption*: Retail sales and PMI Services reflect shifting growth drivers. Table 12

- *Inverse relationship*: Higher values in these indicators reduce GDP growth by increasing costs, lowering productivity, or destabilizing key sectors. Table 13
- *Currency conversion*: ¥ assumed at ~7.2/USD (2024 avg).
- *Sources*: National Bureau of Statistics (NBS), People's Bank of China (PBoC), IMF, World Bank.
- *2024 estimates*: Based on H1 2024 trends (e.g., property crisis, deflation risks).
- *Property sector meltdown*: Evergrande/Country Garden defaults continue to drag down construction (25% of GDP).
- *Deflationary pressures:* PPI deflation (-1.2% in 2024) hurts industrial profits.
- *Geopolitical costs*: U.S. tech bans and "de-risking" by EU disrupt supply chains.

Table 13. Economic Indicators with an Inverse Relationship to China's GDP (2024),Table of key economic indices that have a direct (negative) relationship with CHINa's GDP in 2024, along with their impact in USD ($) and (¥).GDP growth tended to slow. Values are shown in USD and ¥ assumed at ~7.2/USD (2024 avg).

Indicator	Description	Impact on GDP (USD $)	Impact on GDP (¥)	Reason for inverse relationship
Unemployment Rate (Urban Surveyed)	Rising joblessness (e.g., youth unemployment)	-15 $B per 1% rise	-108 ¥B per 1% rise	Reduces consumption, increases social spending
Corporate Debt-to-GDP Ratio	High debt burdens (e.g., property sector crisis)	-50 $B if >160%	-360 ¥B	Debt defaults stifle investment
Non-Performing Loans (NPLs)	Bad loans in banking system (2024: ~2.5% of total)	-30 $B if NPLs rise 0.5%	-216 ¥B	Ties up capital; reduces credit flow
Producer Price Index (PPI) (Deflation)	Falling factory prices (2024: -1.2% YoY)	-20 $B per -1%	-144 ¥B	Squeezes industrial profits
Property Market Decline	Falling home prices/construction (e.g., -5% YoY)	-80 $B	-576 ¥B	Drags down 25% of GDP (linked sectors)
Trade War Tariff Costs	U.S./EU tariffs on Chinese exports (2024 est.)	-25 $B	-180 ¥B	Reduces export competitiveness
Energy Import Costs	Rising oil/coal imports (e.g., $400B in 2024)	-10 $B per 10% price rise	-72 ¥B	Widens trade deficit
Air Pollution Control Costs	GDP loss from industrial shutdowns (e.g., "Blue Sky" policy)	-12 $B	-86 ¥B	Short-term output cuts
Tech Export Bans	Losses from semiconductor restrictions (e.g., ASML bans)	-18 $B	-130 ¥B	Disrupts high-tech manufacturing
Population Decline	Workforce shrinkage (2024: -0.5M people)	-5 $B per 0.1% drop	-36 ¥B	Long-term consumption/labor crisis

CONCLUSIONS

The index analysis reveals divergent price dynamics across sectors. Agriculture showed mild inflation: Fisher ≈ 101.6 (≈1.6% inflation), reflecting supportive policies (e.g. rice minimum prices caused a 14.3% price rise) and steady output. Manufacturing exhibited slight deflation: the Laspeyres price index ≈98.7 (≈1.3% price decline) and Fisher ≈93.9, implying a ~6.1% real output shortfall. This was driven largely by a 21.4% drop in EV unit prices (economies of scale), offsetting smaller price rises in electronics and steel. Services saw strong volume growth but deep price declines: the Laspeyres index ≈82.4 (≈17.6% decline) (Fisher ≈80.2, ~19.8% deflation). Cloud computing and telemedicine volumes surged (+300%, +180%), yet prices fell (-25%, -28%) due to scale efficiencies and market saturation. Exports likewise faced mild deflation: combined Fisher ≈95.4 (~4.6% real price drop), as a booming EV export (+260% quantity) and solar shipments (+120%) were partly offset by falling unit prices (EVs -21.4%, solar panels -28%). Investment-driven sectors saw productivity gains: the combined Laspeyres index for EV battery and semiconductor capacity was ≈108.3 (+8.3% efficiency) and Fisher ≈107.0 (~7% improvement), indicating lower per-unit costs from scale in green tech and chips. In sum, the Fisher indices indicate overall deflation in manufacturing and services and modest inflation in agriculture. These results mirror official data: real GDP growth in 2023 was ~5.2%stats.gov.cn and ~5.0% in 2024china-briefing.com, with services (the largest sector) driving most growth. The heavy deflation in tech-intensive goods and services suggests China's structural shift to high-tech industries and efficiency gains. At the same time, maintaining food and energy price stability remains crucial. Our analysis underscores that nominal GDP growth conceals uneven sectoral trends: strong quantity growth in digital and clean-energy sectors coexists with price pressures that may dampen producers' revenues.

Recommendations

- *Support high-growth tech sectors*: Continue incentivizing investment and R&D in electric vehicles, batteries, semiconductors, cloud infrastructure, and biotech. These areas showed explosive volume growth and improved unit efficiencieschina-briefing.com. Public–private partnerships and relaxed FDI policies in advanced manufacturing can sustain this momentum.
- *Scale up digital economy*: Promote further expansion of cloud computing, e-commerce, and other IT services through infrastructure upgrades and skill development. Given cloud capacity grew +300% (Laspeyres price index 75), supporting competition and adoption can deepen price efficiencies.
- *Stabilize key commodities*: Maintain or strengthen minimum-price supports and biosecurity measures for staple crops and livestock. For example, pork output rose 33.8%, but prices fell 12.5% (recovering from past shortages); ensuring buffer stocks and encouraging sustainable herd size can prevent volatility. Similarly, continuing rice and wheat price floors (rice prices rose 14.3% due to policy) will safeguard food security without stunting production.
- *Address export overcapacity*: Negotiate trade remedies or production adjustment in oversupplied export industries (e.g. solar panels, steel). Solar panel prices fell 28% despite +120% output, and anti-dumping duties on Chinese steel are contentious. Coordinated supply management and diversification of export markets can help stabilize prices and trade relations.

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