

China's Economy: Achievements; Institutional Constraints; and Development

Barry Naughton

(IR/PS, University of California, San Diego)

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Four Major Themes:

1. The end of “hyper-growth” phase looms, and growth strategy must be adapted. Broad discussion of “middle income trap.”
2. (Independently) A critical re-evaluation of recent policy, combined with crisis of confidence in reform. A new administration is taking over.
3. Innovation and technology upgrading: massive increase in inputs to the technology process, combined with rapid increase in direct government intervention, “techno-industrial policy.”
4. This rather nationalist intervention is in tension with the most striking characteristic of China’s high technology industry, which is its deep integration with global production networks.

China's Economic Success:

China has grown faster, longer, than any economy in history. Yet also a rather typical “economic miracle” like several other fore-runner economies.

For the past decade (2003-2010), China has been in a “super-phase” of accelerated growth. GDP growth was pushed *above* 10% for five years in a row (2003-2007). This super phase was driven by:

- Successful reforms in the 1990s;
- Massive investment that facilitated rapid structural change;
- WTO membership, and (until 2008) robust global growth.

The result is that China has “emerged” much more rapidly than anybody anticipated. A global player in every dimension. The possibility that China can enter the ranks of “high income” economies by 2030 (according to the World Bank).

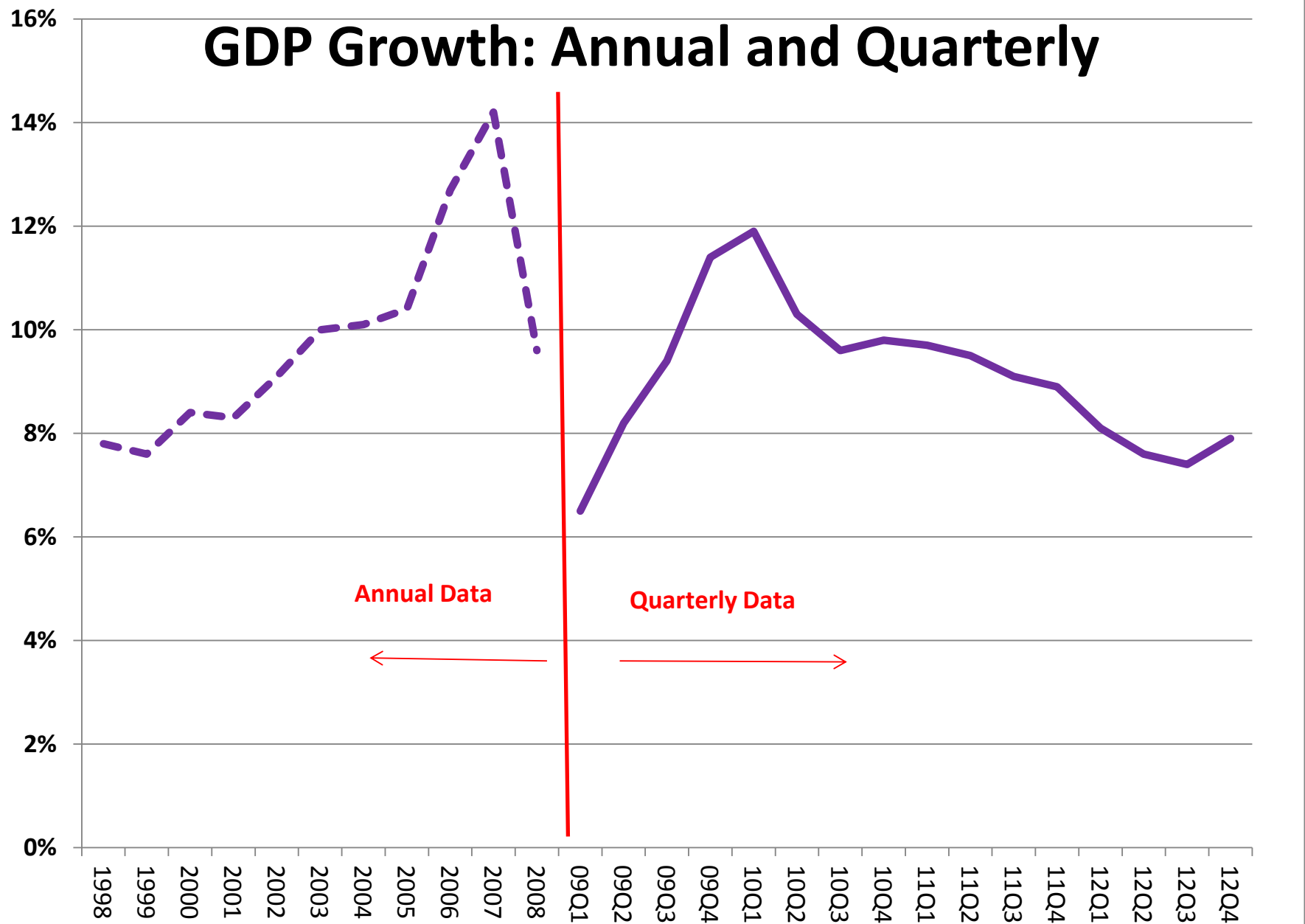
1. Changing Conditions: End of “Hyper-Growth Phase”

Yes, China has been very successful, but a completely new set of economic and political conditions are emerging in China. These are “long run” changes, but they are occurring remarkably quickly, and right now.

- Labor force supply conditions are changing very quickly, such that the supply of unskilled labor is already declining, and unskilled wages are rising quickly.
- Extremely high investment rate may not be sustainable.
- Demand growth in developed countries likely to remain sluggish for an extended period, suppressing export growth.

As a result, there is a broadly held view in Beijing that “what worked in the past won’t work in the future.” The drive to “change development strategy” is quite strong. Is the current growth slow-down the precursor to a broader and longer-lasting slowdown? Will the economy slow without short-run economic crisis?

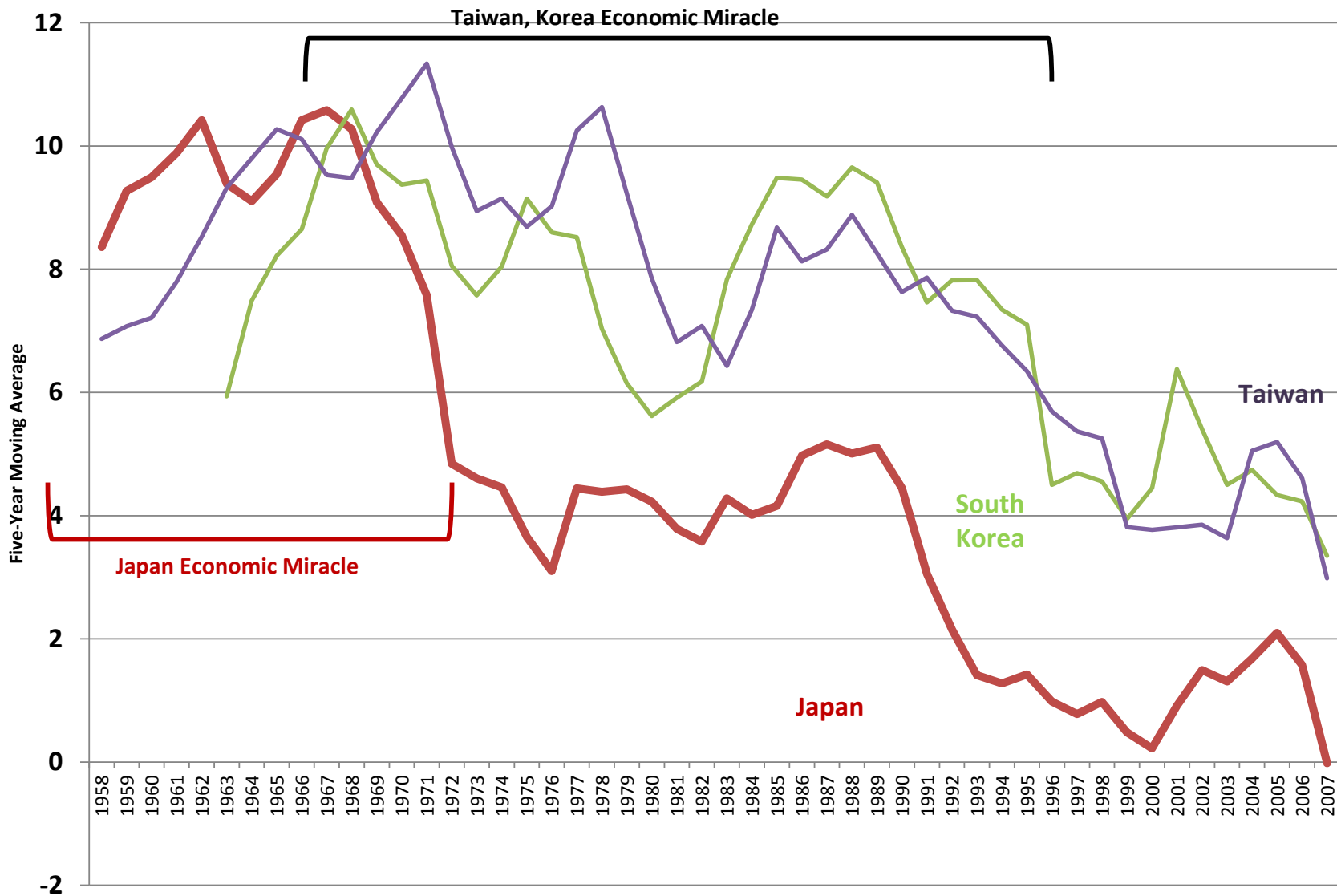
GDP Growth: Annual and Quarterly



Since the extraordinary—but clearly unsustainable—growth surge of 2003-2008, growth has drifted steadily downward.

Prior Growth Miracles Have Had Abrupt Ends

Gross Domestic Product (GDP)--Growth Rates

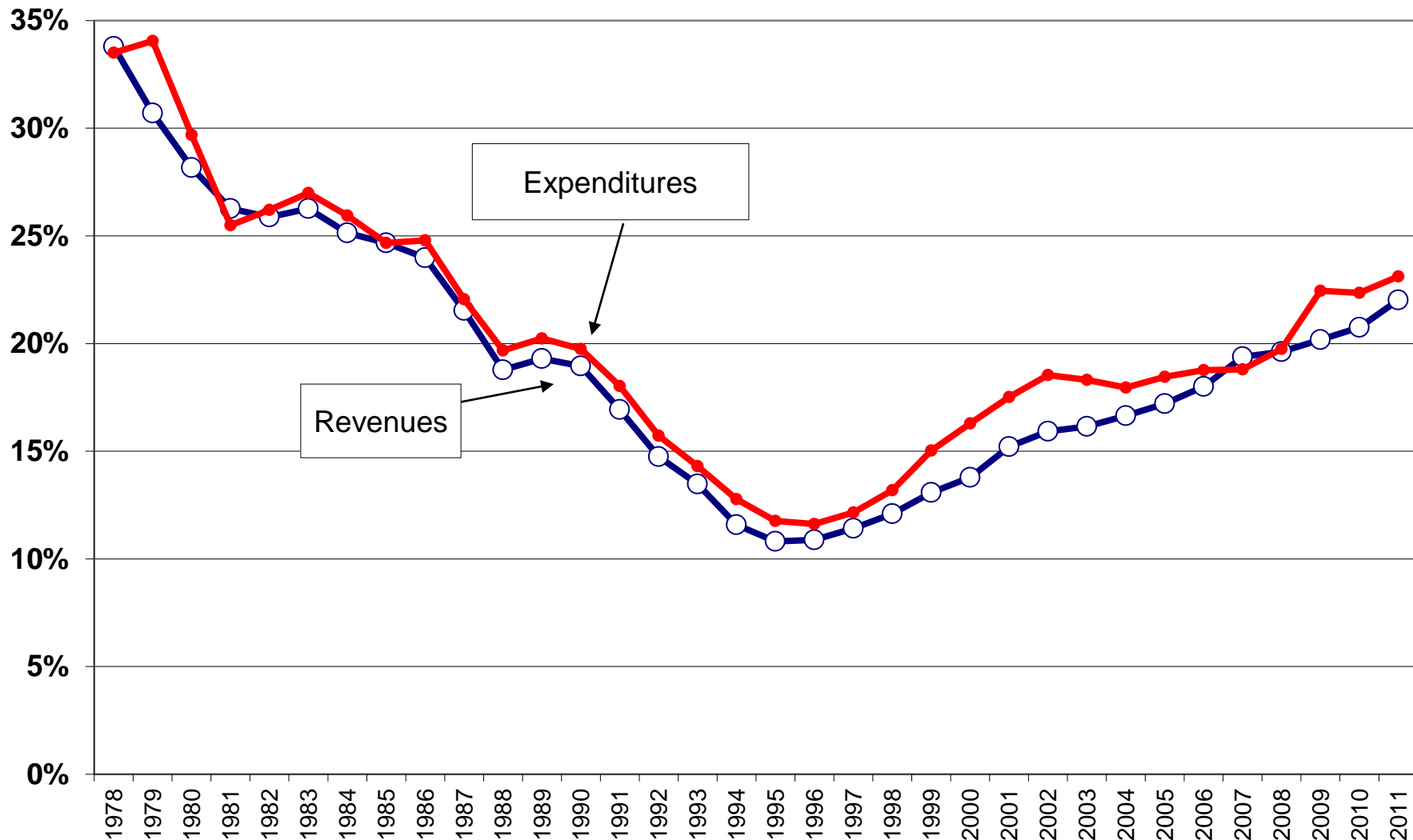


2. Critical Re-evaluation of Policy in the Last Administration:

- Judging from the standpoint of announced Chinese government objective, the departing Hu Jintao-Wen Jiabao Administration has two major successes and two major failures.
- Successes:
 - Began to repair and rebuild the Chinese social welfare system: reducing rural taxation; creating rudimentary universal health insurance (at very low level); fixing some of the biggest holes in the welfare and pension systems; and improving education.
 - Built Chinese military power, creating the beginning of a credible modern military force.
- Failures:
 - Failed to follow through on any of the market-oriented reform measures articulated at the beginning of the administration; stagnation and regression of market reforms have created a loss of credibility.
 - Failed to shift the pattern of economic development (growth strategy). Seven years after announcing this goal, Chinese growth remains dependent on government investment.

Underlying the achievements has been a huge increase in government resources.

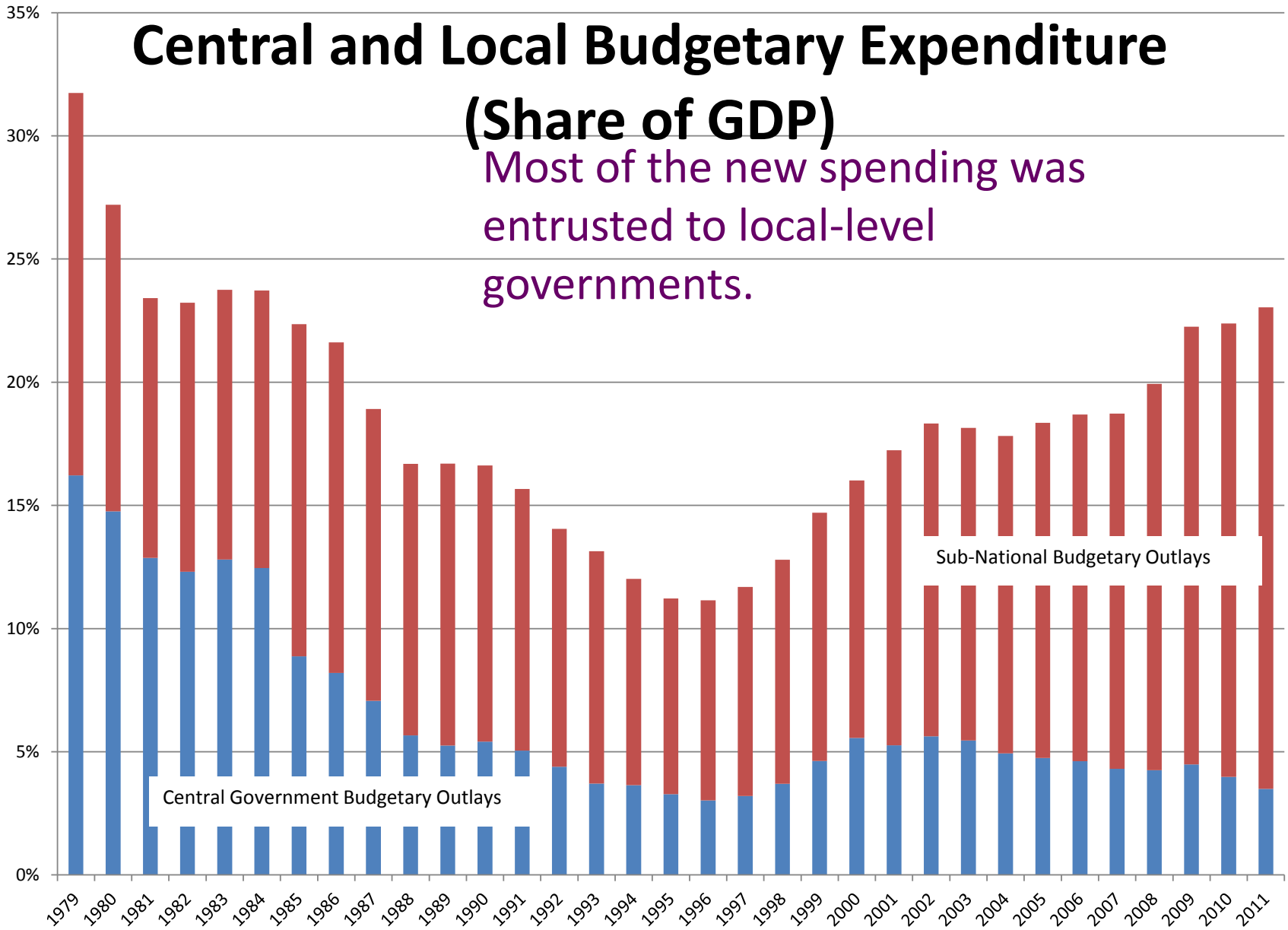
China: Budget Share in GDP



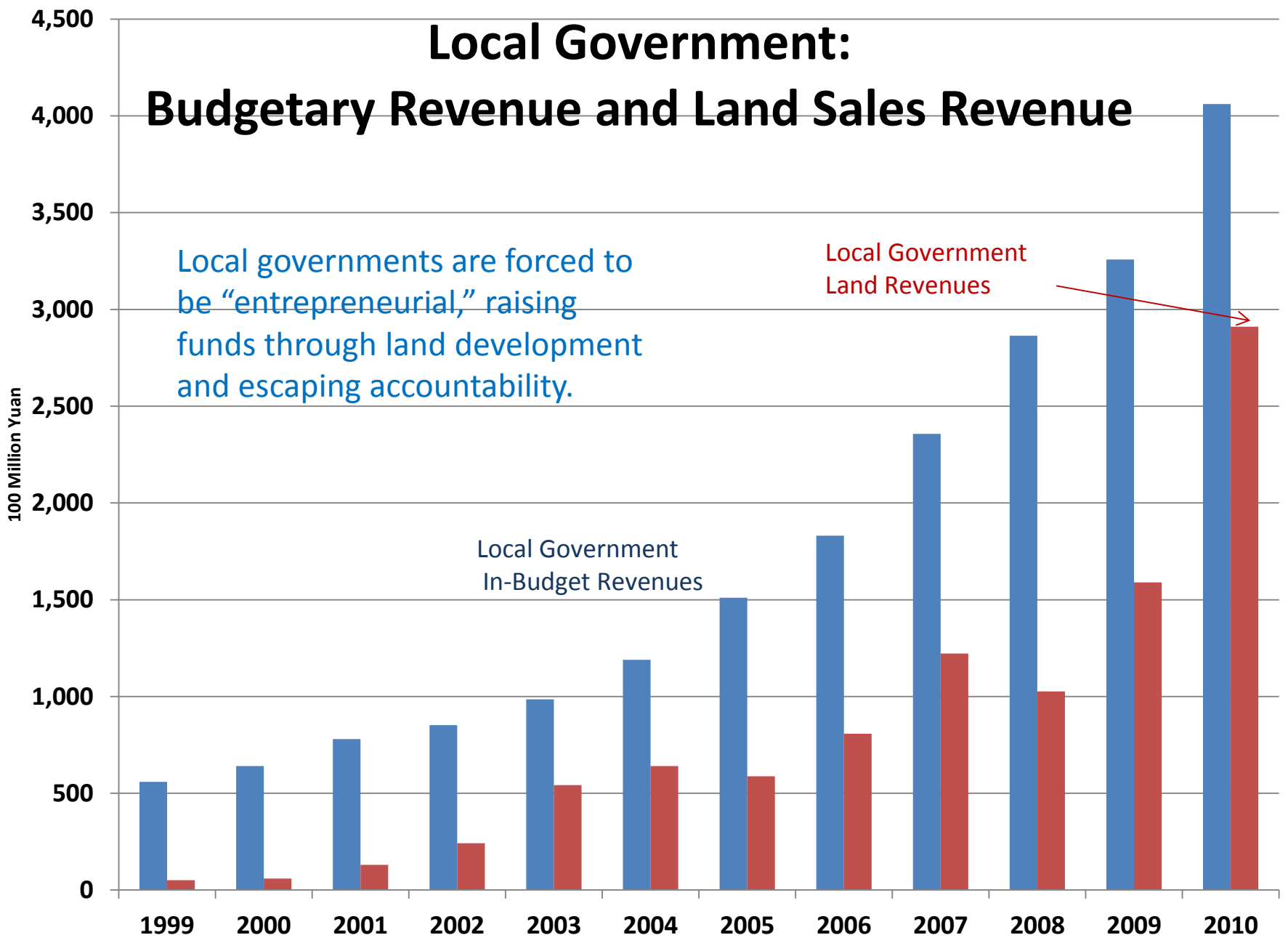
While changes in fiscal institutions lag far behind:

Central and Local Budgetary Expenditure (Share of GDP)

Most of the new spending was entrusted to local-level governments.



Local Government: Budgetary Revenue and Land Sales Revenue



The new leaders express concerns and commit to a new round of reforms:

- Xi Jinping 习近平: “空谈误国, 实干兴邦” “Empty talk endangers the nation; only hard work achieves national revival,”
- Li Keqiang 李克强: “改革如逆水行舟, 不进则退。” “Reform is like a boat beating against the current; if you don’t move forward, you will slip back.”
- The clear implication is that the previous administration has been engaging in empty talk, and slipping backwards.
- But the new economic reform program has not yet been developed.

3. Government Technology Policy: focused on increasing inputs and intervening in strategic sectors.

Considering technological development in the form of an innovation (or technology) production function:

A. Inputs

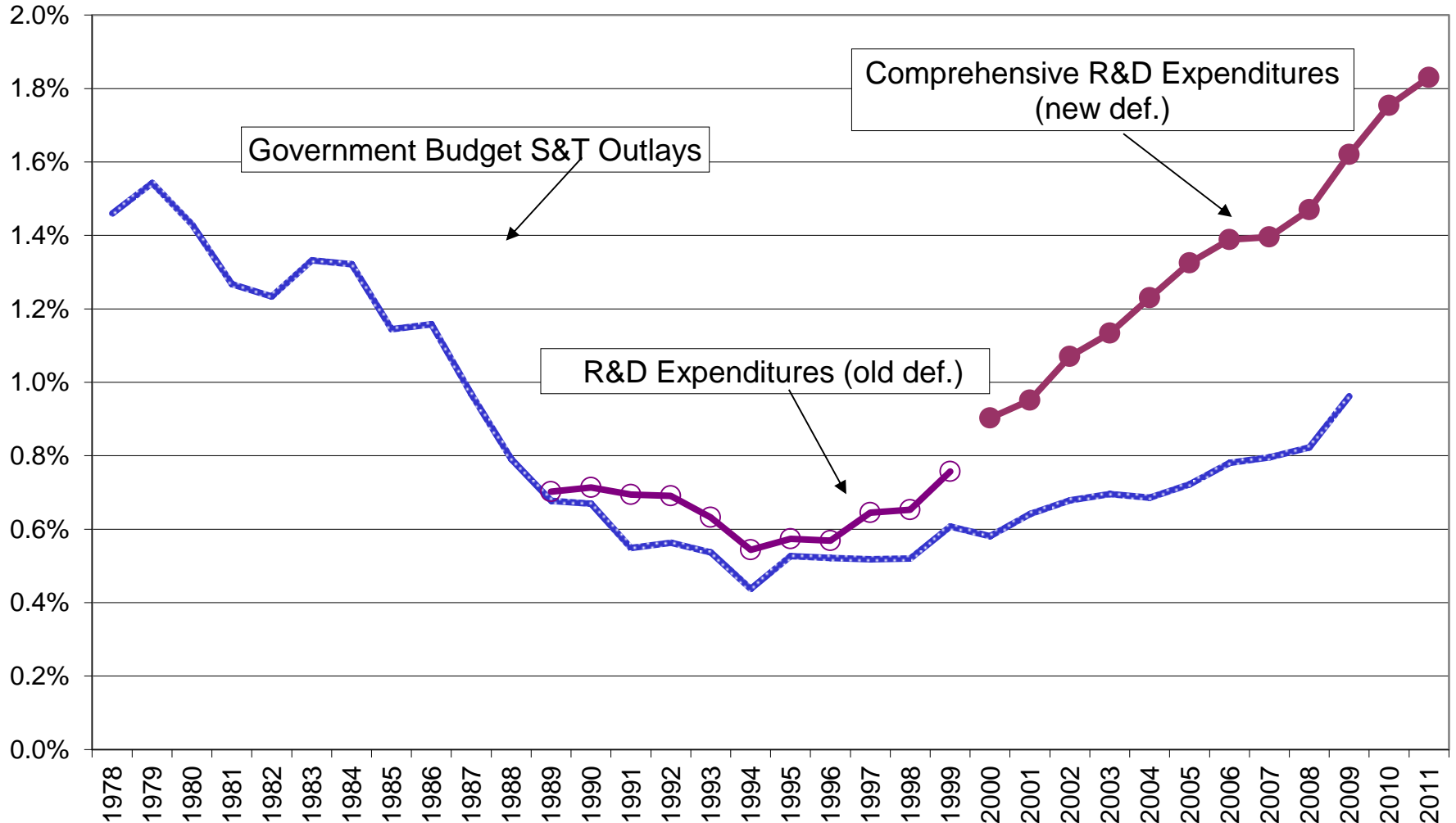
--Human Resource Base

--Effort: Resources, Financing, etc.

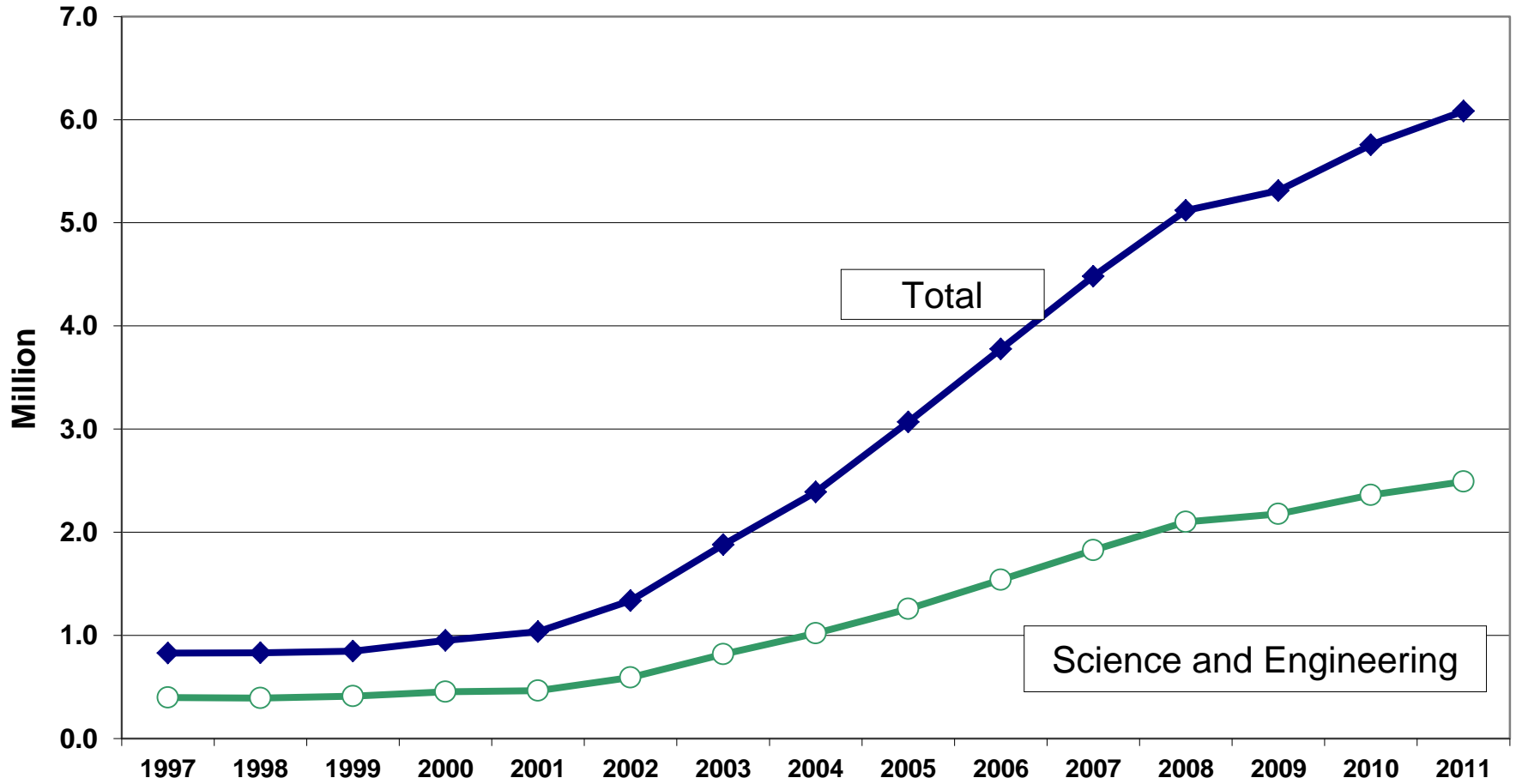
B. Institutions and Incentives, including Policy and Strategy

C. Output of higher productivity and increased innovation (difficult to measure).

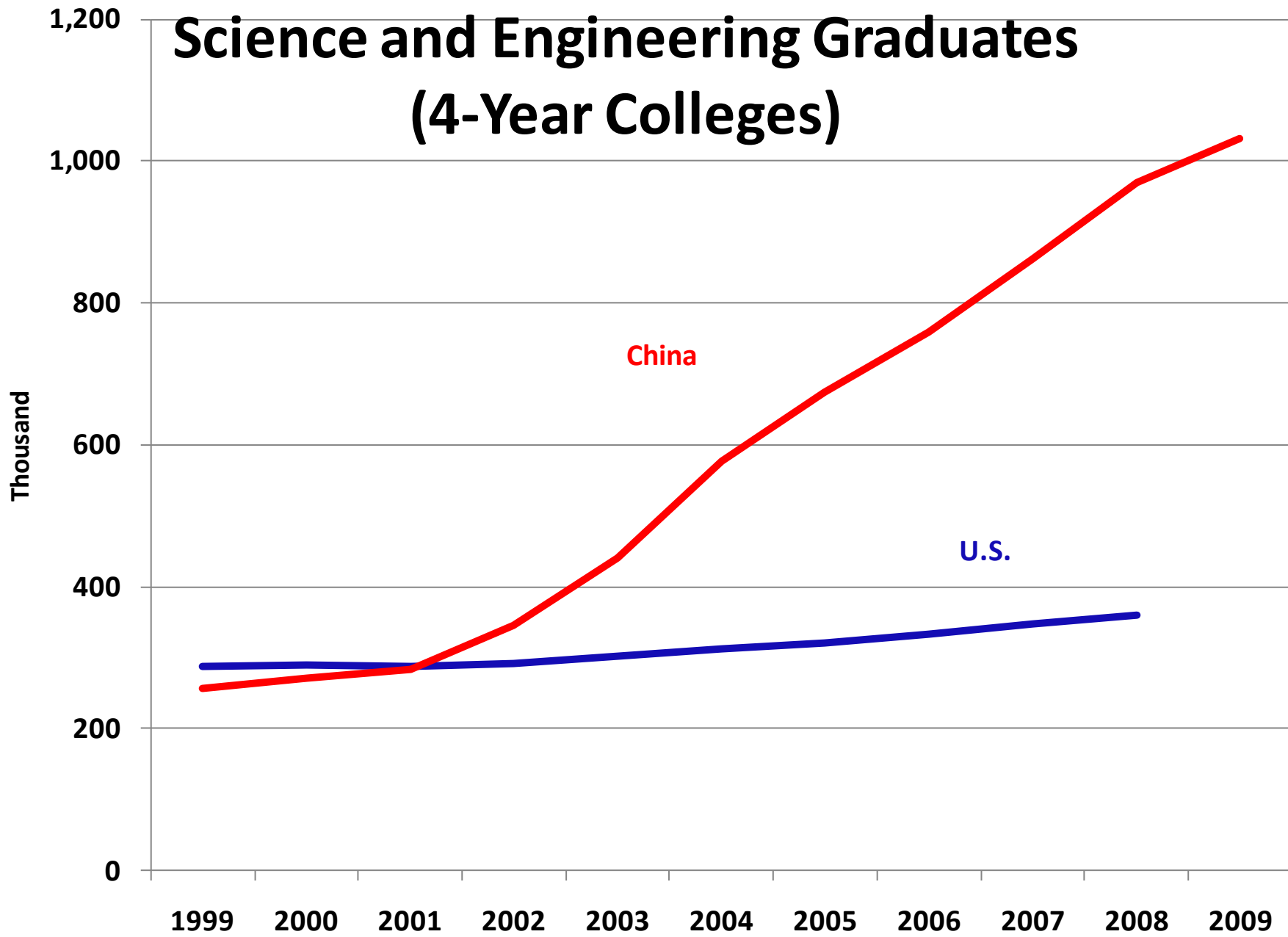
Research and Development Expenditures (Percent GDP)



Graduates of College and Technical School

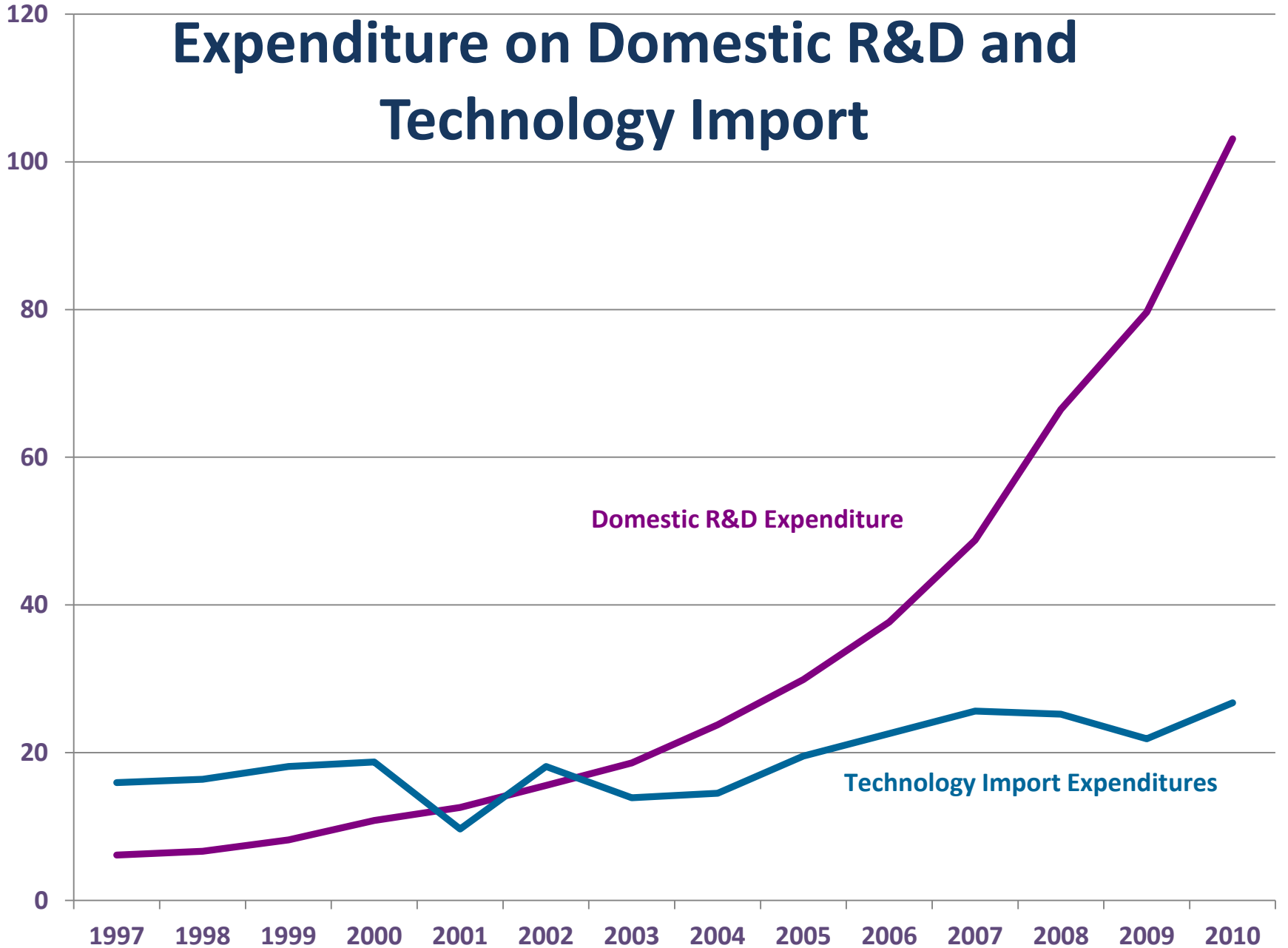


Science and Engineering Graduates (4-Year Colleges)



Expenditure on Domestic R&D and Technology Import

Billion US Dollars



2. New Technology Initiatives

- Corresponds to the “Institutions and Incentives” portion of the technology development framework.
- New industrial policies: direct government intervention to:
 - Foster technological development
 - Rapidly expand direct government investment
 - Pick winners: sectors; technologies; firms.
 - Build out whole sectors by mastering “core technologies.”

A. “Autonomous Innovation” 自主创新: Broad with Multiple Policy Strands

Medium and Long-term Plan for Science and Technology (MLP). Formulated in 2005-6, to extend from 2006-2020.

Aggressive use of domestic technology standards, most notable TD-SCDMA the “indigenous” Chinese standard for 3G telecom.

Procurement preferences for indigenous products.

New in 2009-10: “the degree of intensity and simultaneous use of multiple tools” – Scott Kennedy

Panoply of policy instruments used with overlapping, and unpredictable impact; overlapping central and local initiatives.

C. Strategic Emerging Industries

September 2009, the diverse strands begun or accelerated during the stimulus program begin to be tied into a program.

From that time until the present, steady fleshing out of instruments, scope and resources.



Workers hauling ingots of 99.9% pure silicon through the dusty streets.

* Seven strategic emerging industries

Strategic Emerging Industry	Focus 35 Sub-Sectors
New information technology (IT) industry	New mobile communication, next generation Internet, tri-networks integration (broadcasting network, telecommunication network, internet), Internet of things, cloud computing, Integrated Circuit, new display, high-end software, high-end server and information service.
Energy-saving and environmental protection industry	High efficiency and energy saving, advanced environmental protection, key technology, equipment, product and service for resource recycling
Biology industry	Biomedical, biomedical engineering products, bio agriculture and bio manufacturing.
High-end equipment manufacturing industry	Aviation equipment, satellite and their applications, railway vehicles equipment, Intelligent-manufacturing equipment
New energy industry	New generation nuclear power, solar energy-thermal application, solar thermal and solar PV(photovoltaic) electricity generation, wind energy technology equipment, smart grid, and biomass energy.
New material industry	New functional material, advanced structural material, high performance fiber and its composite and common basic materials.
New energy automobile industry	Plug-in Hybrid Electric Vehicle (HEV), Battery Electric Vehicle (BEV) and Fuel Cell Electric Vehicle (FCEV) technology

Planned Trajectory of Strategic Emerging Industries

Strategic Emerging Industries: Share of GDP

	2010	2015	2020
New IT Industry	2.5%		
High-end Machinery	0.5%		
Biotech	0.3%		
Conservation and EP	0.3%		
New Energy			
New Materials	0.4%		
Electric+ Vehicles			
Total	4.0%	8.0%	15.0%

These projections imply growth rates in the 20-24% range for the next decade. The first four industries are expected to grow more rapidly than the final three. The strategic emerging industries would account for about 20% of industrial value-added in 2015, and 40% in 2020.

Enterprise-based R&D?

In theory, the enterprise is supposed to be the focus of the R&D effort, but in practice only a handful of firms are capable of launching a big effort, and most of those are state-owned enterprises.

Table 4: Top "Innovative" Firms: R&D Effort and Patents Received

		R&D Outlays (Billion RMB)	R&D Personnel (Thousand)	Patent Stock (end 2010)	New Patents Rec'd 2010
Employ-own	Huawei	16.56	49.0	14,939	2,776
State Spin-off	ZTE	7.09	27.9	9,178	2,434
SASAC Institute	China Academy of Telecom Technology			2,105	710
SASAC	China Petrochemical Corporation	7.12	28.6	8,258	577
Private	BYD		21.5	1,000	365
SASAC	China National Chemical Corporation			1,981	313
SASAC	China National Petroleum Corporation	9.41	30.2	1,366	300

These seven firms are the only seven Chinese firms with a stock of 1,000 or more invention patents as of the end of 2010.

Outcomes: Too Early to Tell

- None of the strategic emerging industries is doing well.
- “Big push” centralized efforts have met with some success: the moon landing program is roughly on schedule.
- The increased supply of trained engineers and technicians has enabled many new entrepreneurial strategies; sustained China as the low-cost locale for R&D. China is “where the talent is” so you can’t ignore it, despite problems.

4. Fundamental Dilemma: Increasing Globalization of Knowledge and Division of Labor

- Deep insertion into global value chains is the most striking characteristic of China's high technology industry.
- China's insertion into global value chains until today has been passive and low value.
- China's "indigenous innovation" is based on the idea that core technologies cannot/will not be transferred.
 - Aims to replicate the entire value chain in China, as China moves out of low-skill "ghetto."
 - Tension with multi-national companies that seek to maintain the profitability of their leading edge technologies, while also seeking to use China to drive down costs.

China's Existing High-Tech Economy is Dominated by Foreign Firms

- Of China's "High Tech Industry" output (official definition, mainly IT hardware).
 - Foreign-invested firms 46%
 - Taiwan/Hong Kong firms 19%
 - Domestic Gov't Controlled 11%
 - [Remainder] [24%]
- Of China's High Tech Exports
 - 86% are from foreign-invested firms
 - 84% are via Export-processing (EP) trade

Case Study: Integrated Circuit Design (IC Design) Industry

- Global value chain is increasingly dis-integrated, with specialization dispersed.
 - Fabless IC design firms vs. “Pure play” foundries.
 - Integrated device manufacturers (IDMs) like Intel and Samsung still important.
- New, further stage of dis-integration in recent years with three inter-related components:
 - Increasing dis-integration.
 - Movement to Asia.
 - Rapid technological change that has forced even major players out of the market.

Signature Industrial Policy Initiatives in Sectors Closely Related to IC Design

- IC Fabrication: Since 1999, China has exerted strong efforts to foster a domestic industry (wafer fabs). Despite the effort:
 - Domestic production is still a small proportion of use;
 - China lags in process technology and wafer size;
 - The trade deficit in ICs continues to grow.
- Indigenous technology standard TD-SCDMA:
 - Has survived, and true 3G handsets for TD-SCDMA are reaching Chinese consumers *this year* (2013).
 - Fostering TD-SCDMA delayed 3G roll-out in China by 3 years (but does it matter?)
 - This despite China's market power: over a billion subscribers, and 22% of global smart-phone market today.
- But this does not mean that China's IC design sector does not have outstanding examples of success...

China IC Market vs. IC Production Trends



Source: IC Insights

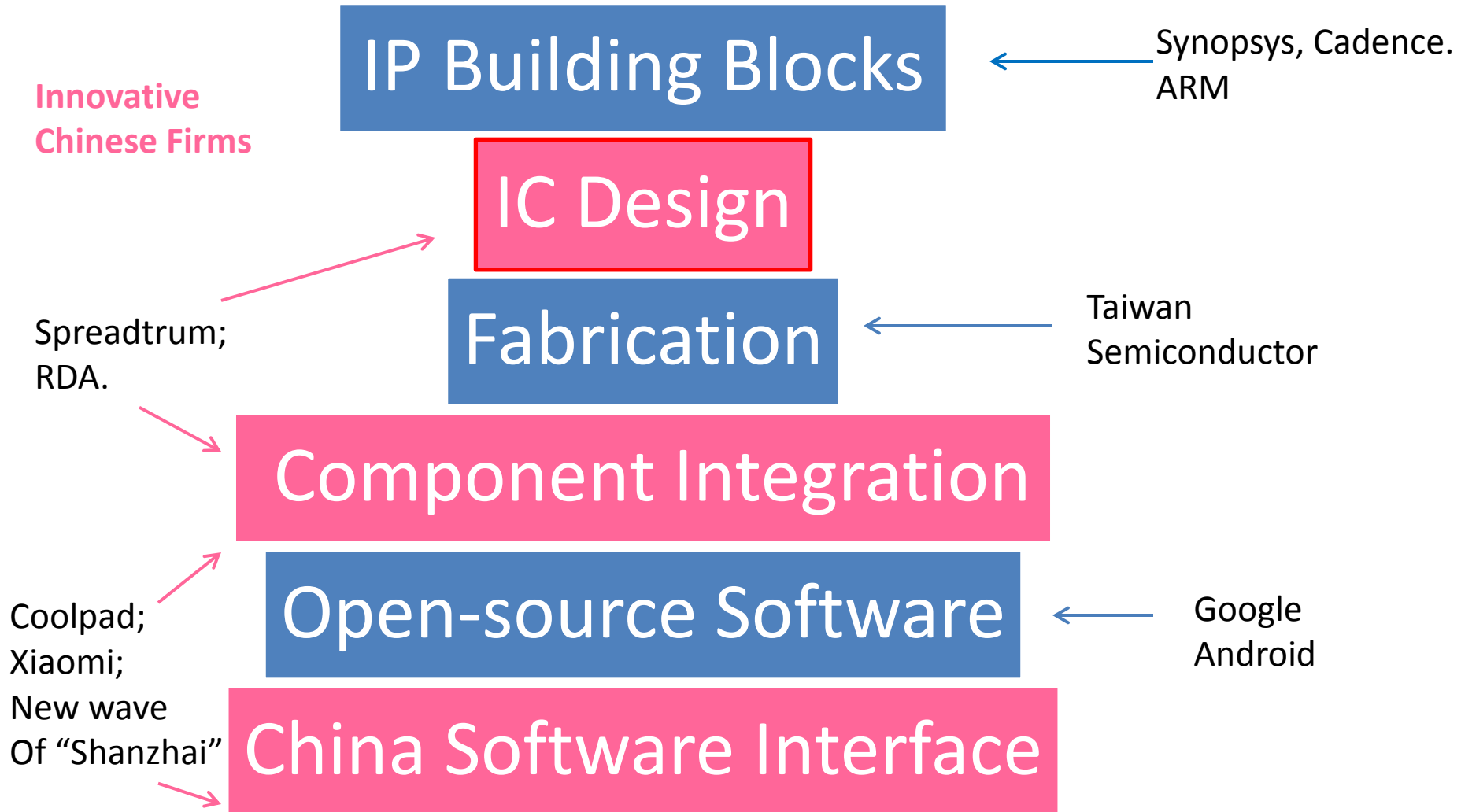
China's production capacity lags consumption

Global Dis-integration Lowers Entry Barriers for Chinese IC Firms

“The availability of IC design tools, semiconductor fab services, and open-source smartphone software [Android] allows Chinese firms to circumvent their weak spots and develop their strengths in hardware, IC design, and integration.”

-Interview, Leo Li, CEO of Spreadtrum, Chinese telephone handset IC design company, June 2012.

Newly Dis-Integrated Value Chain:



Innovative Firms Grow Up, but typically not in “core technologies.”

- Innovative firms develop cost-saving and “catch-up” technologies.
- They must be nimble and efficient, because they operate in the spaces opened-up by giants, must operate across borders.
- They have enormous trouble preserving margins big enough to fund continuing high levels of R&D and rapid expansion.
- Several years ago, the Taiwan IC Design firm Mediatek enabled a new ecology of “Shanzhai” or white box producers in China. This innovation destroyed a whole generation of handset producers, and spawned a new industry.
- This type of disruption is happening again, as China moves into the 3G era. Cheap smart-phones are hitting the China market as this is written.
- This type of innovation creates enormous downward pressure on prices and margins. Can any company make money producing ICs? Can these firms accumulate enough volume to drive down costs further and survive in the competition against international giants like Samsung, Qualcomm and Apple?

Concluding with Questions:

Given China's success and increasing global prominence, there is unusual uncertainty in the immediate future:

1. How will China weather the end of the hyper-growth era?
2. Will the critical assessment of the Hu-Wen era lead the new leaders to a dramatic new program of economic reforms? If so, what will it include?
3. Will the massive Chinese commitment to human capital and industrial promotion pay off?
4. Will the new innovative Chinese firms weather the storms of market competition?