

From “Made in China” to “Innovated in China”: Necessity, Prospect, and Challenges

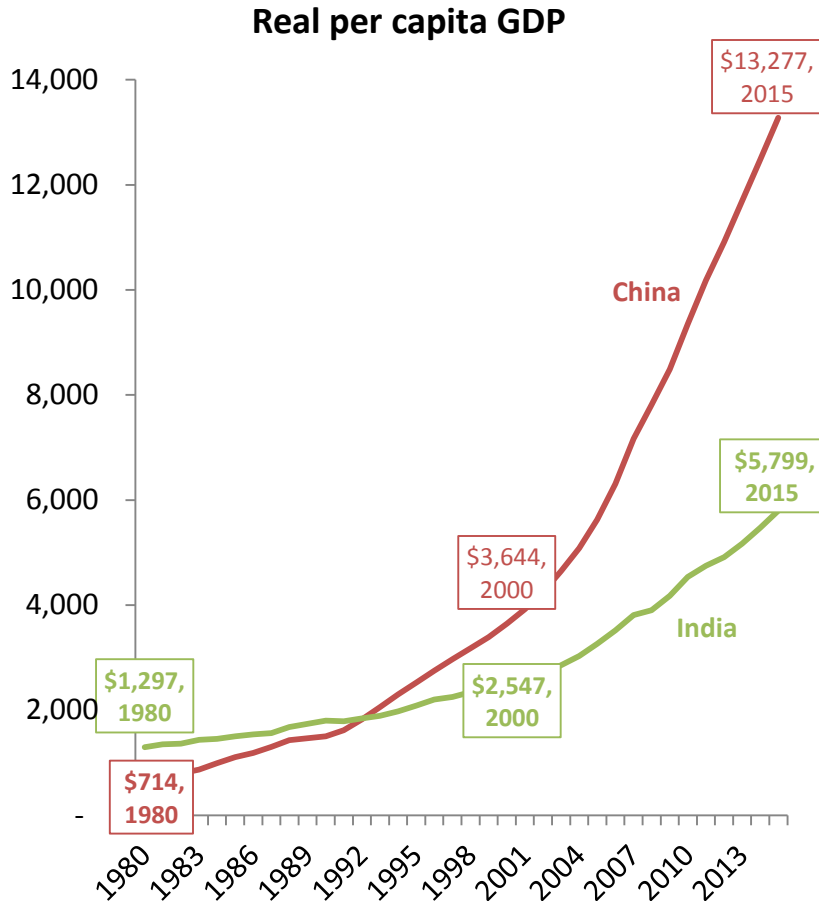
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Based on joint research with Zhuan Xie and Xiaobo Zhang
Prepared for a special issue of *Journal of Economic Perspective*

- China matters for the world
 - China and US macro-economy
 - Low interest rate and housing bubble
 - The rise of Donald Trump?
 - Neglected positive side
 - Higher living standard due to trading with China
 - Faster growth across the world due in part to the rise of China

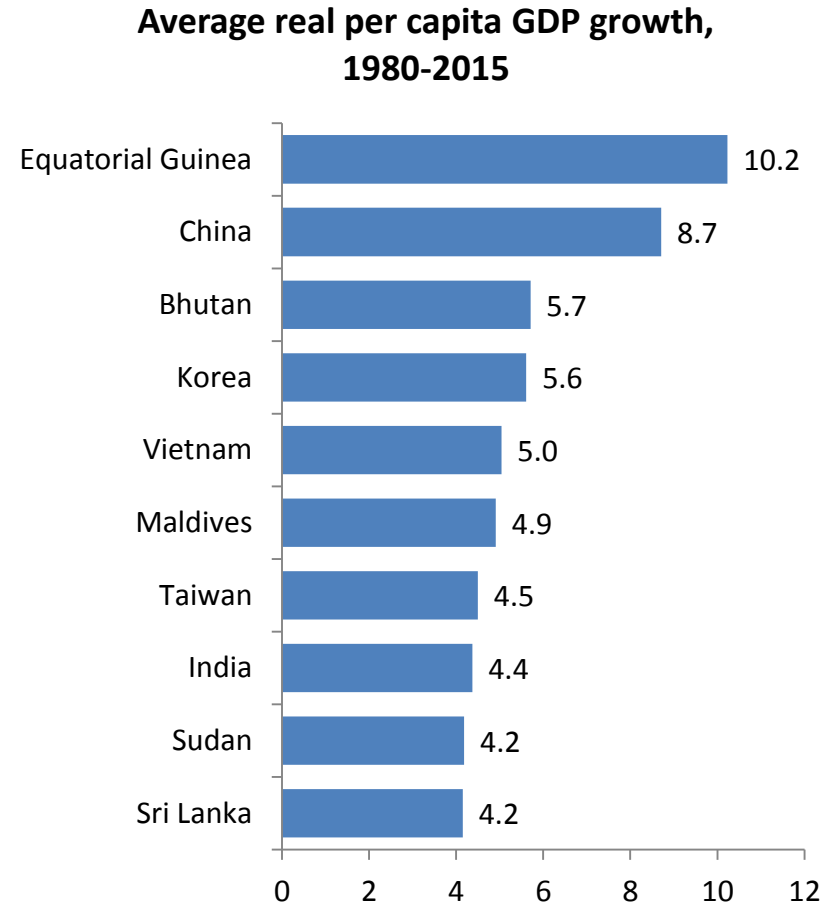


China's (past) growth has been spectacular



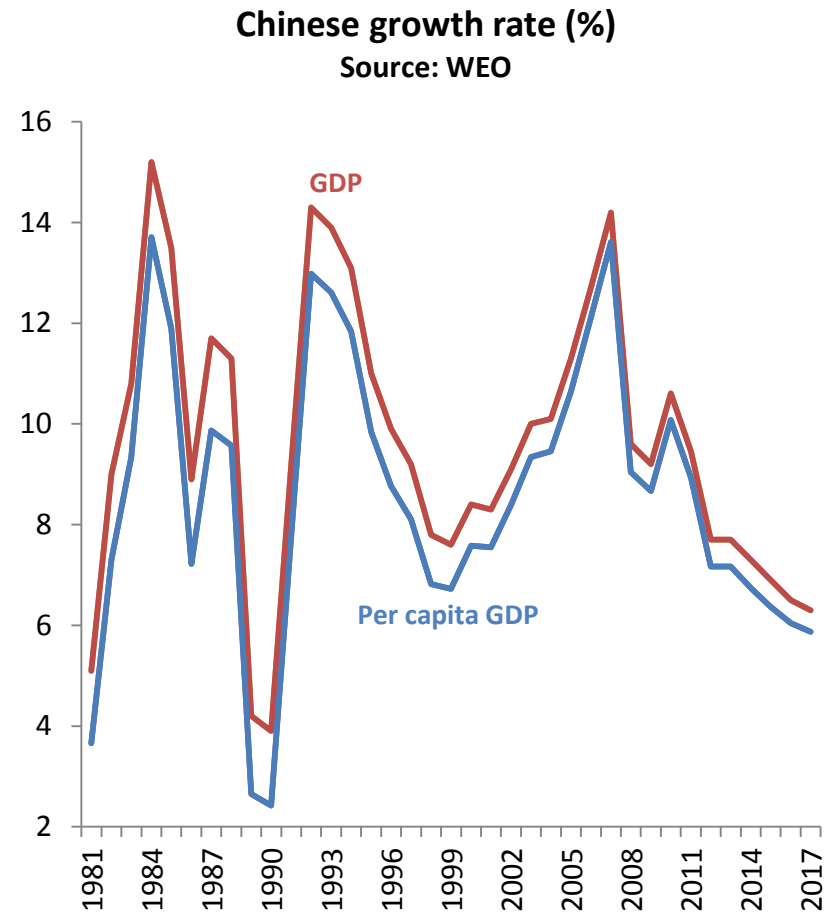
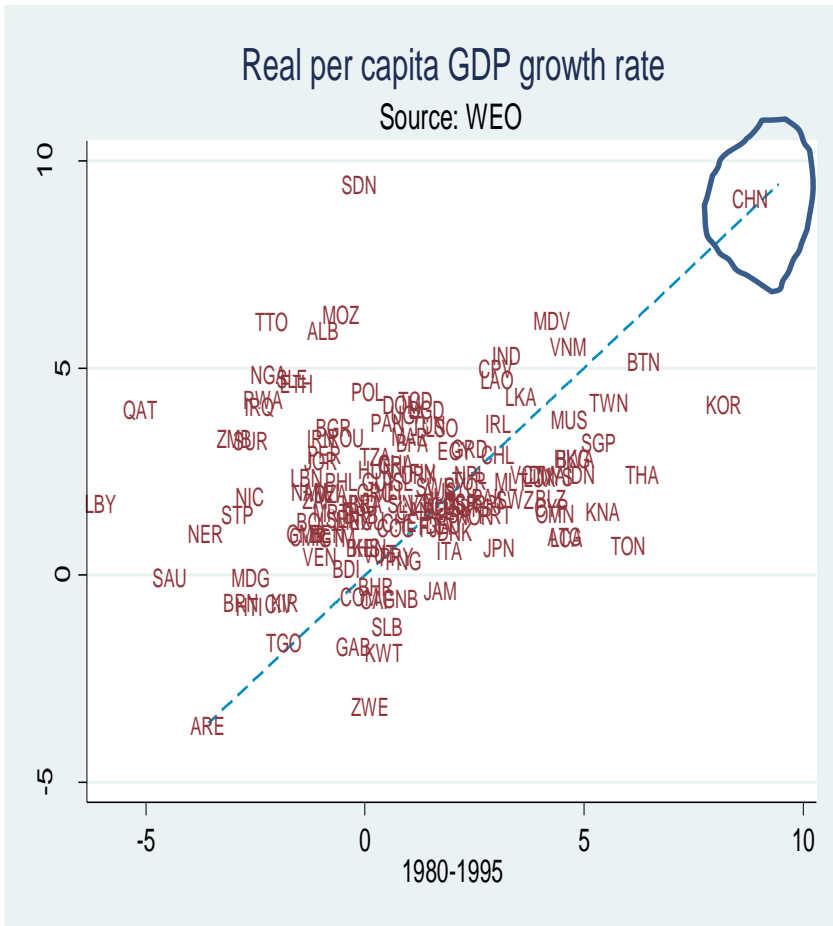
Note: Figures in 2011 PPP.

Source: ADB calculations from WEO April 2016.



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Notes: Figures in 2011 PPP. Excluding outliers: Liberia and Equatorial Guinea

Some numbers to put things in perspective

- Average real per capita GDP growth of 8.7% during 1980–2015
- Real per capita GDP increased from \$714 in 1980 to \$13,277 in 2015
- Only Equatorial Guinea has exceeded China's performance
- Real per capita GDP growth of more than 6% for 25 consecutive years from 1990–2015

Note: Figures in 2011 PPP.

Reasons for the growth success (1)

- Policy actions
- Economic fundamentals

Reasons for the growth success (2)

- Policy actions

- Embracing market oriented reforms

- Agriculture -“household responsibility system”
 - Industry and service
 - “grasp the large and let go of the small”
 - Lower entry barriers

- Embracing globalization

- “Democratization” of trading rights
 - Openness to FDI
 - Accession to the WTO

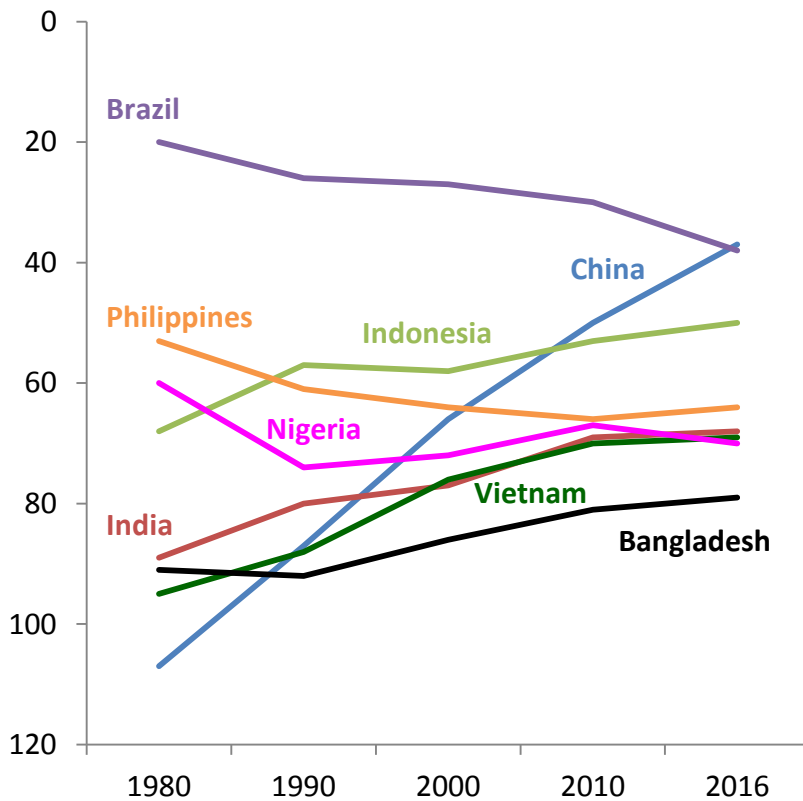
- Minimizing resistance

- Dual track system
 - Special economic zones
 - Political centralization + economic decentralization

Reasons for the growth success (3)

Economic Fundamentals: low wage + favorable demographics

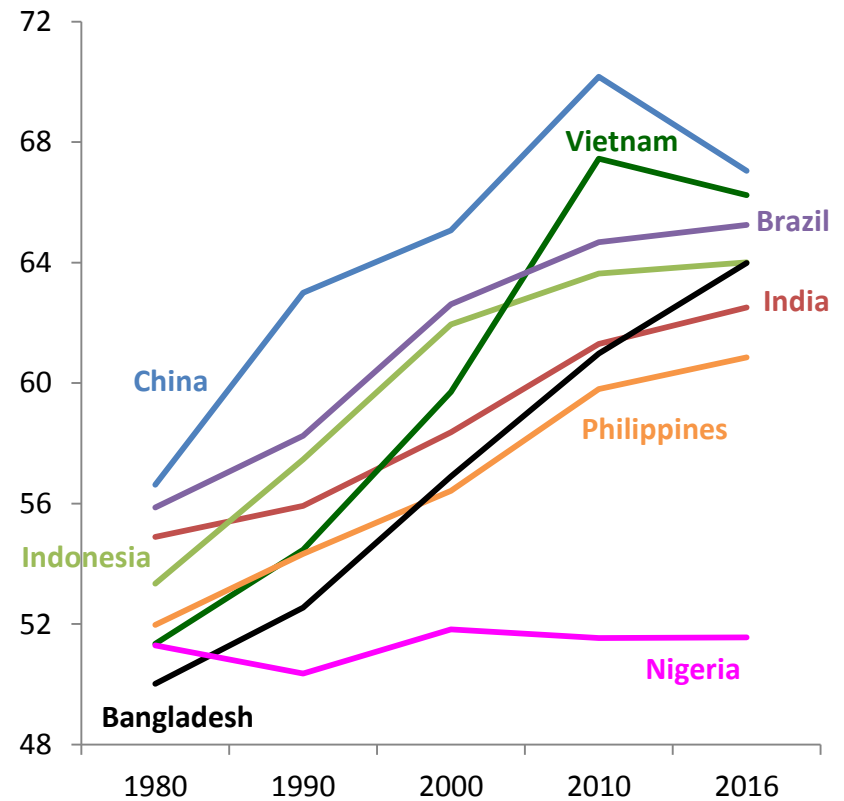
Rank of real per capita GDP among 138 non-OECD countries



Note: Figures in 2011 PPP.

Source: ADB calculations from WEO April 2016.

Share of working age cohort (15-59) in population (%)



Source: Haver Analytics.

Rio Olympics opening ceremony



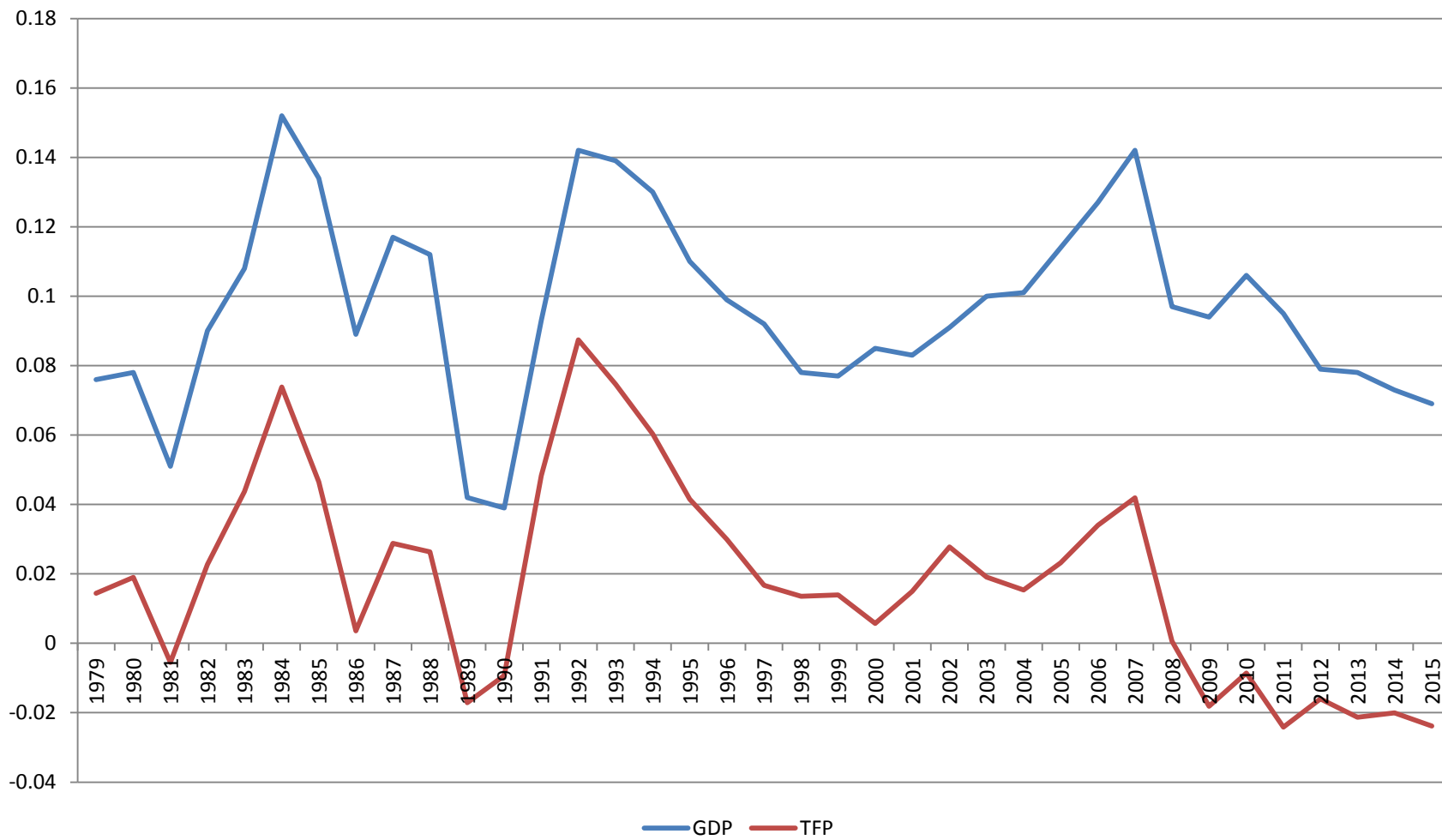
Beijing Olympics opening ceremony



Chinese factories: Past and present

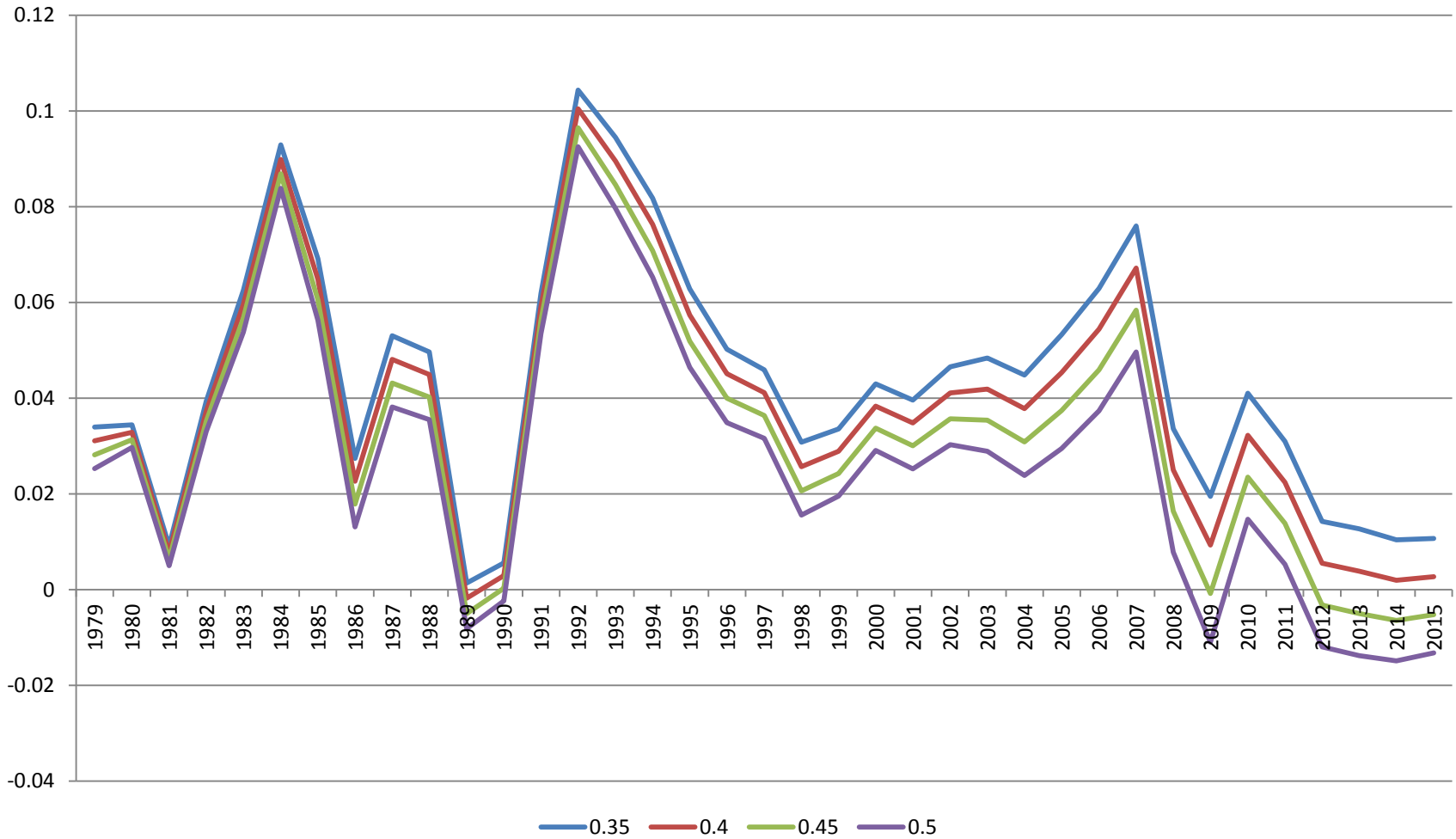


Growth rate of GDP and TFP



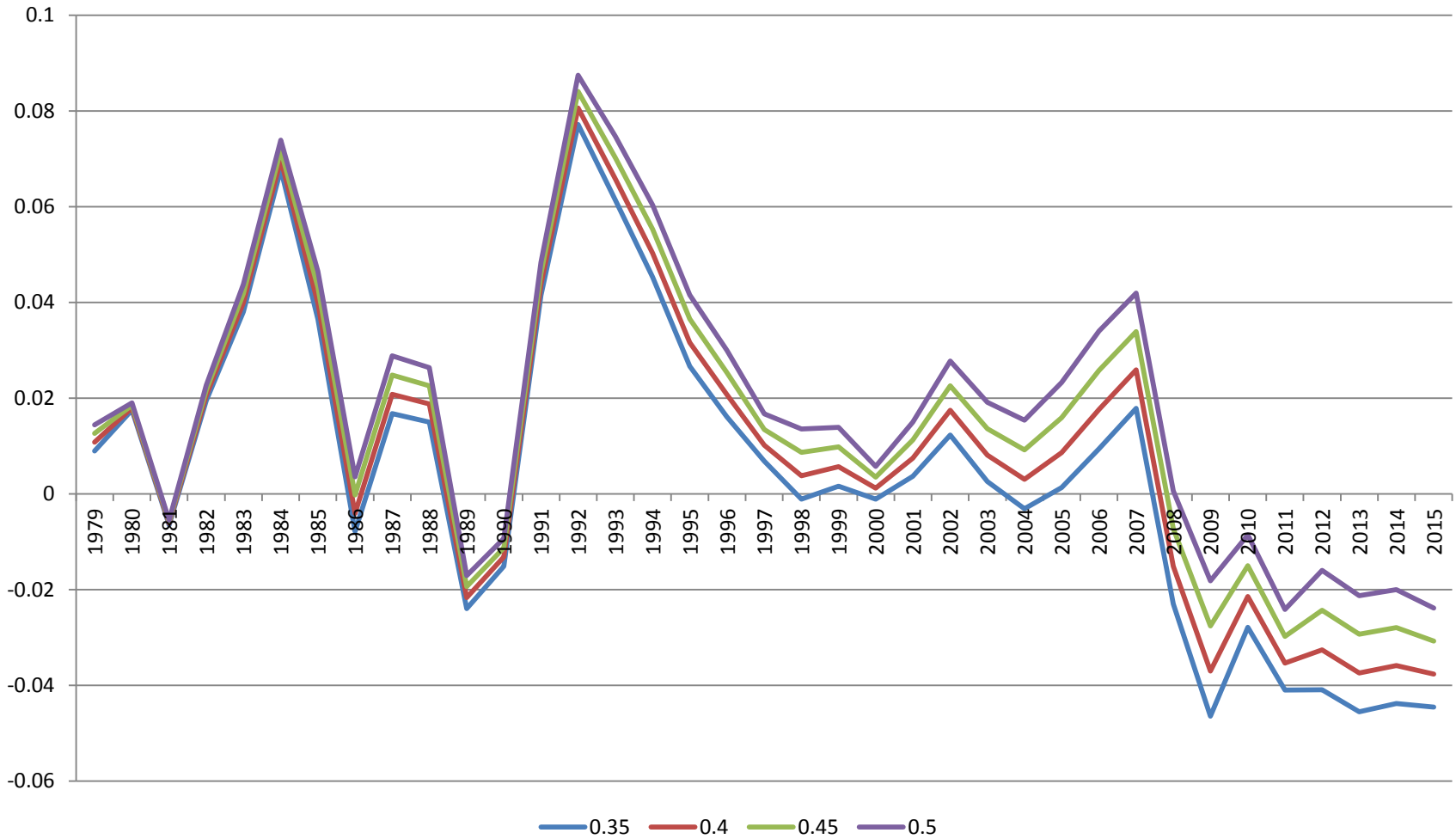
Let capital share=0.5

TFP



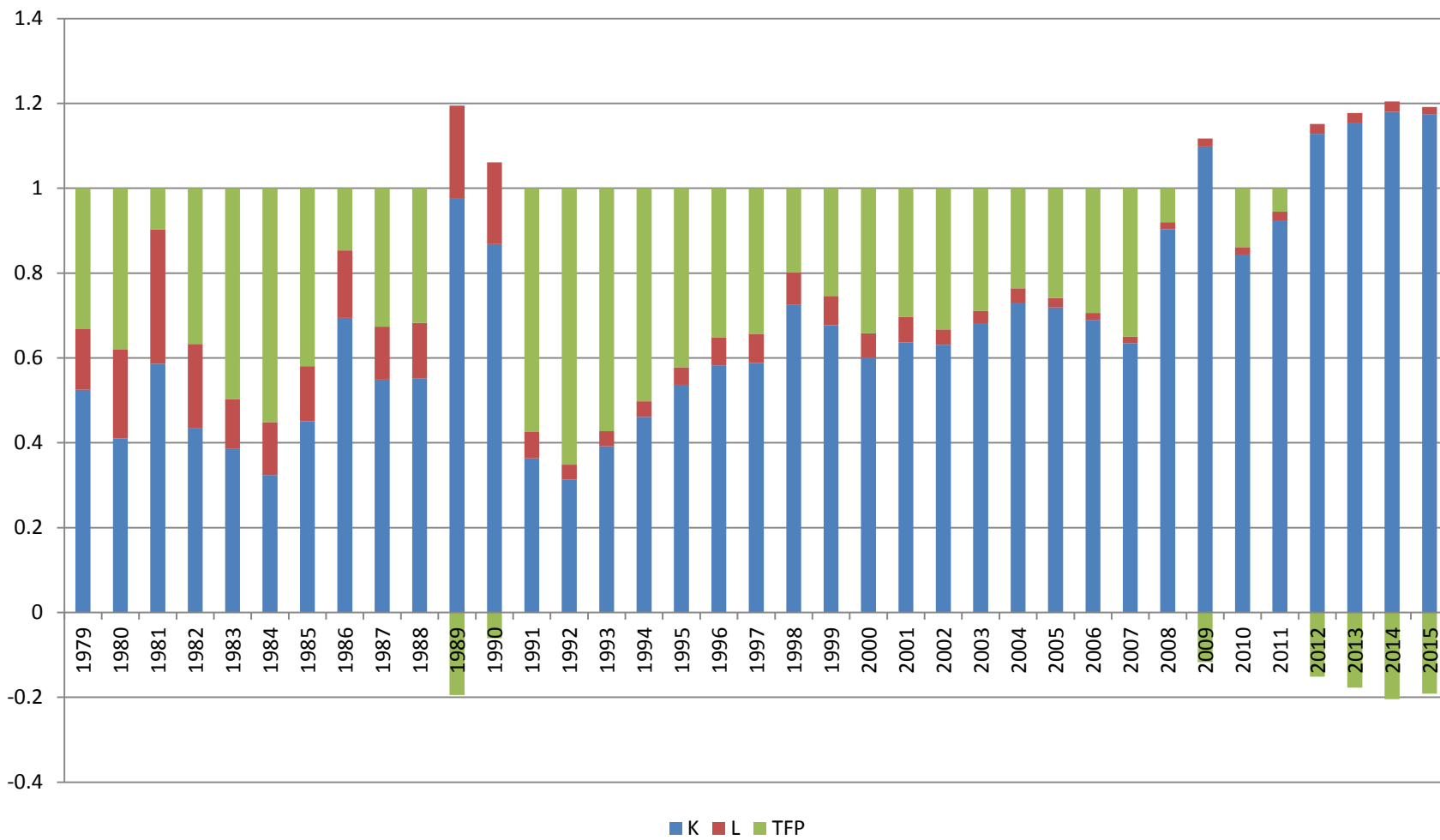
Capital and workers as input. The parameters are different capital income share.

TFP (adjusting for schooling of labor force)



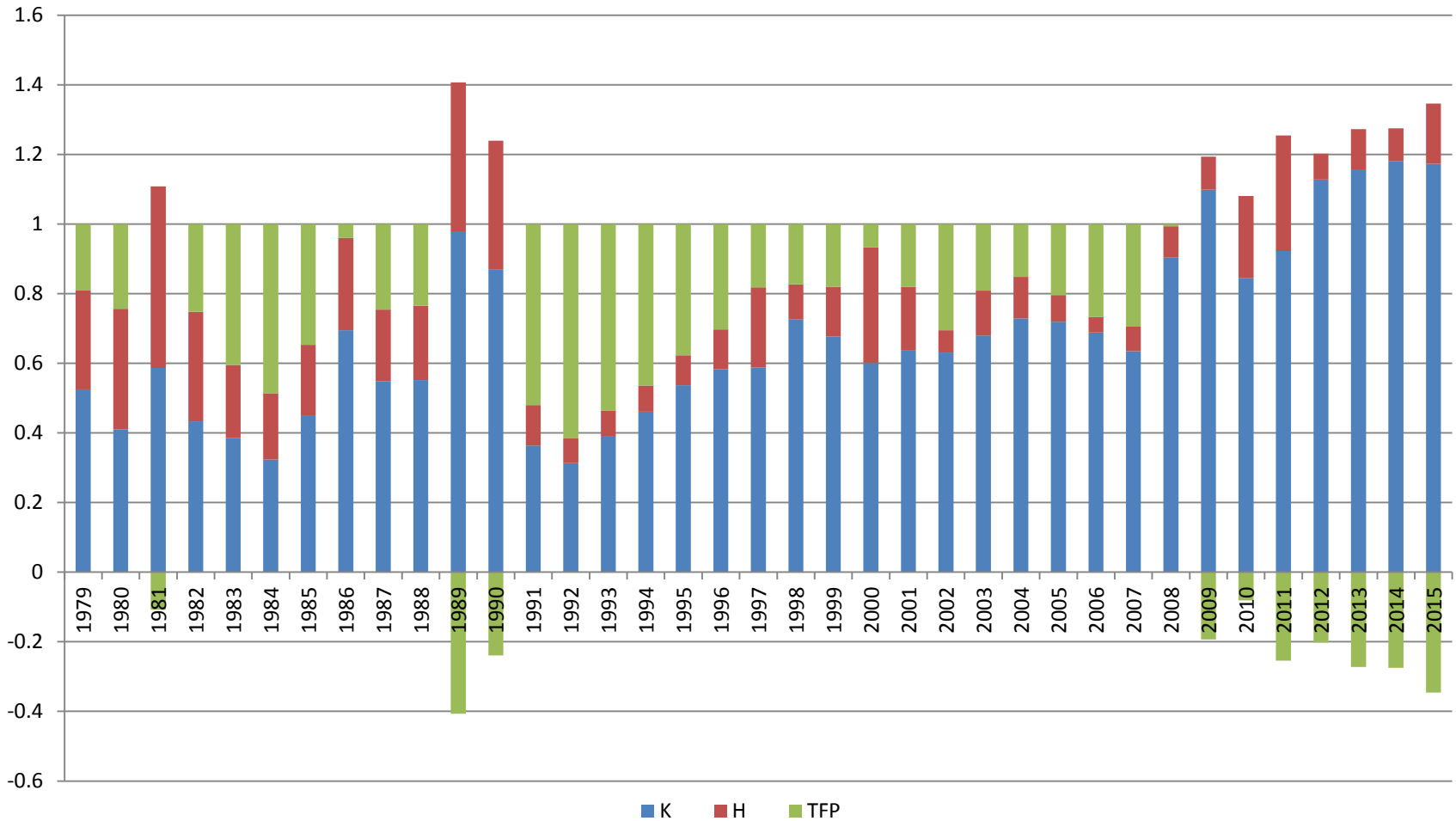
Capital and number of workers, average years of education as input.

Contribution of K,L and TFP



Capital share is 0.5

Contribution of K,H and TFP



H= education* L. Capital share is 0.5.

Growth is likely to moderate further

- Due to cyclical (weak global economy) and structural factors (rising wages, shrinking workforce)
- Changes to postpone retirement age, increase female labor force participation, and relax family planning policy will not reverse the trend in the short-run
- Future growth must mainly come from labor productivity growth

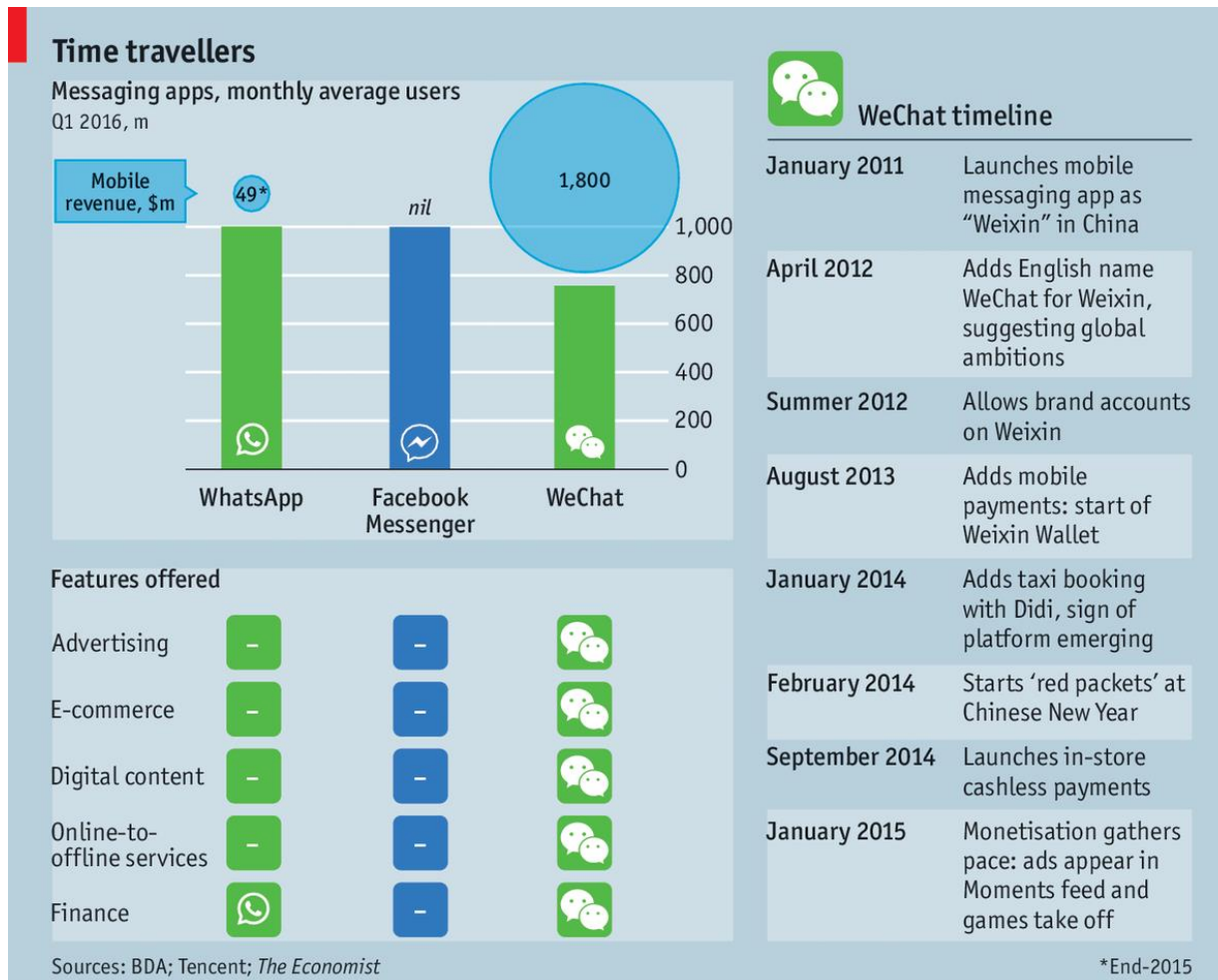
- Can the transition from “made in China” to “innovated in China” happen?

If you want to look reasons to say no, you can find them

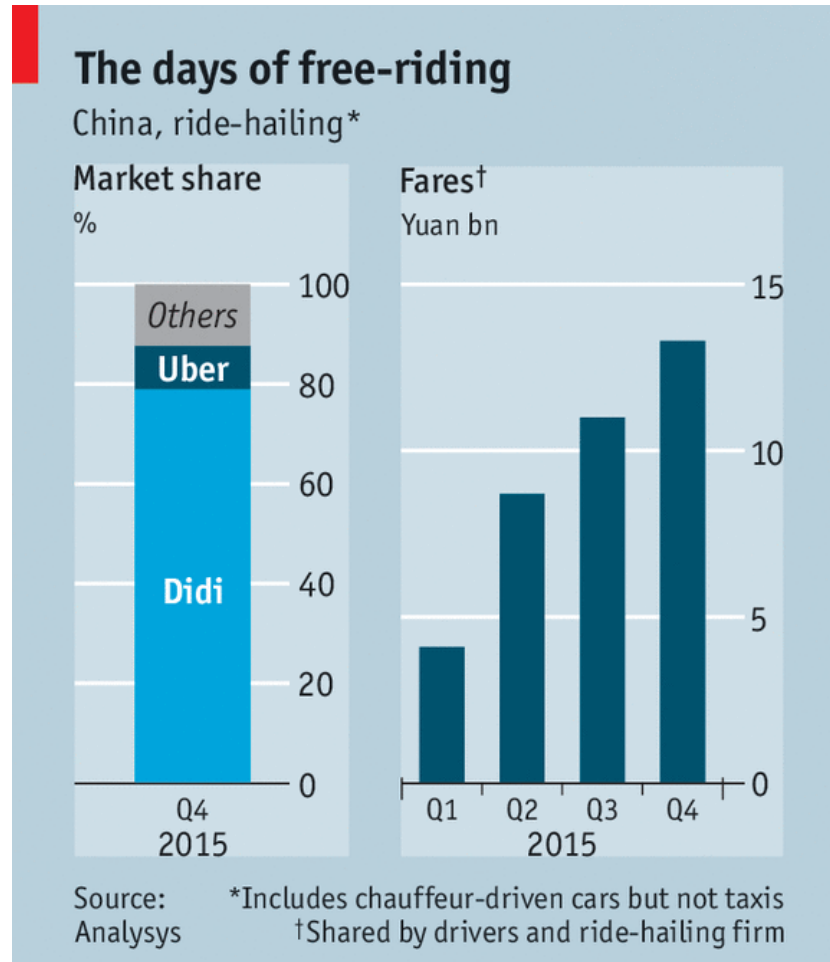


If you wish to look for optimistic examples, you can find them too.

WeChat's world



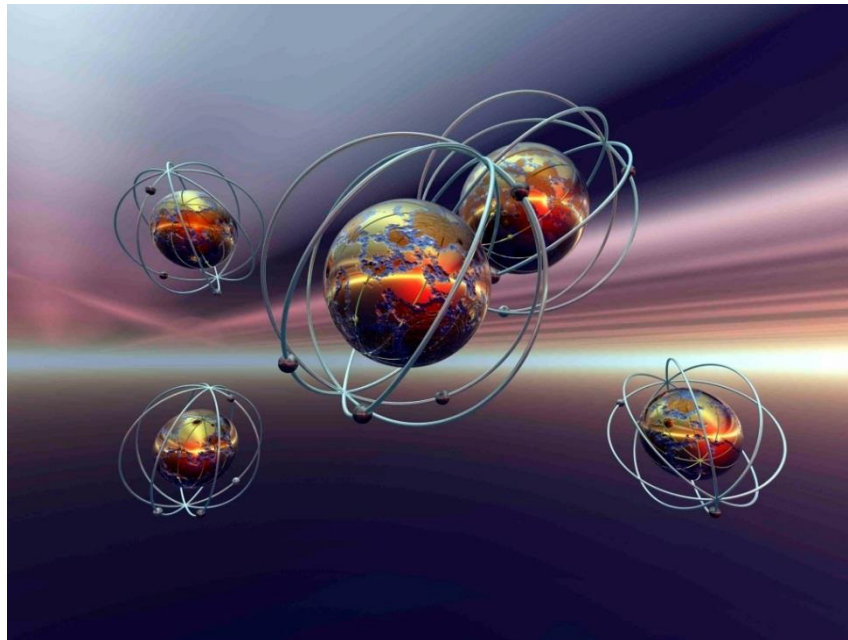
Uber gives app



Economist.com

“China’s Launch of Quantum Satellite Major Step in Space Technology,”

New York Times Aug 6, 2016

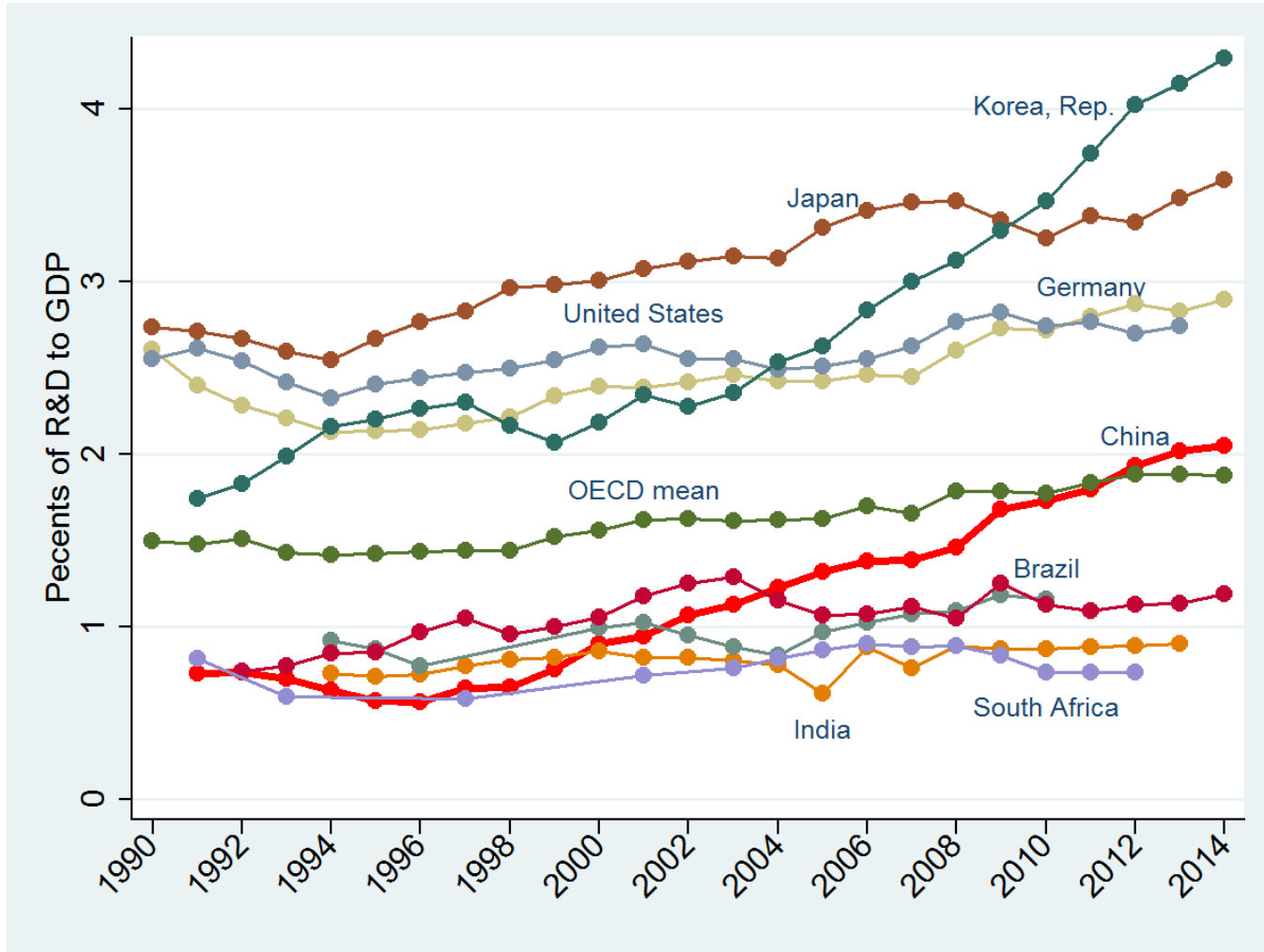


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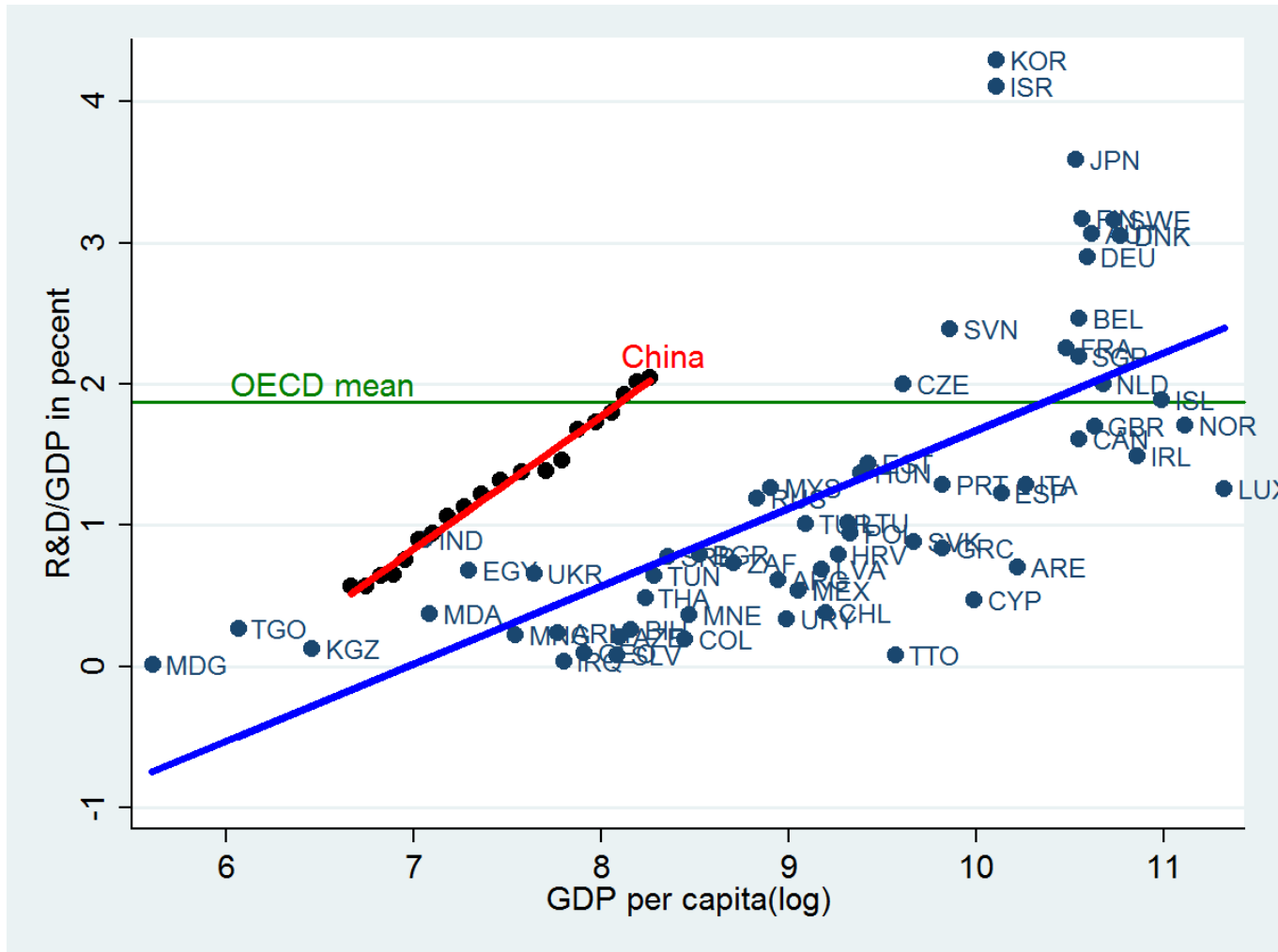
What do the systematic data say?

- What is the actual growth of innovation of China's firms?
- What accounts for the relatively fast pace of innovation (as measured by patent applications and approvals) by Chinese firms?
- Is there possible resource misallocation in the innovation space?

R&D to GDP



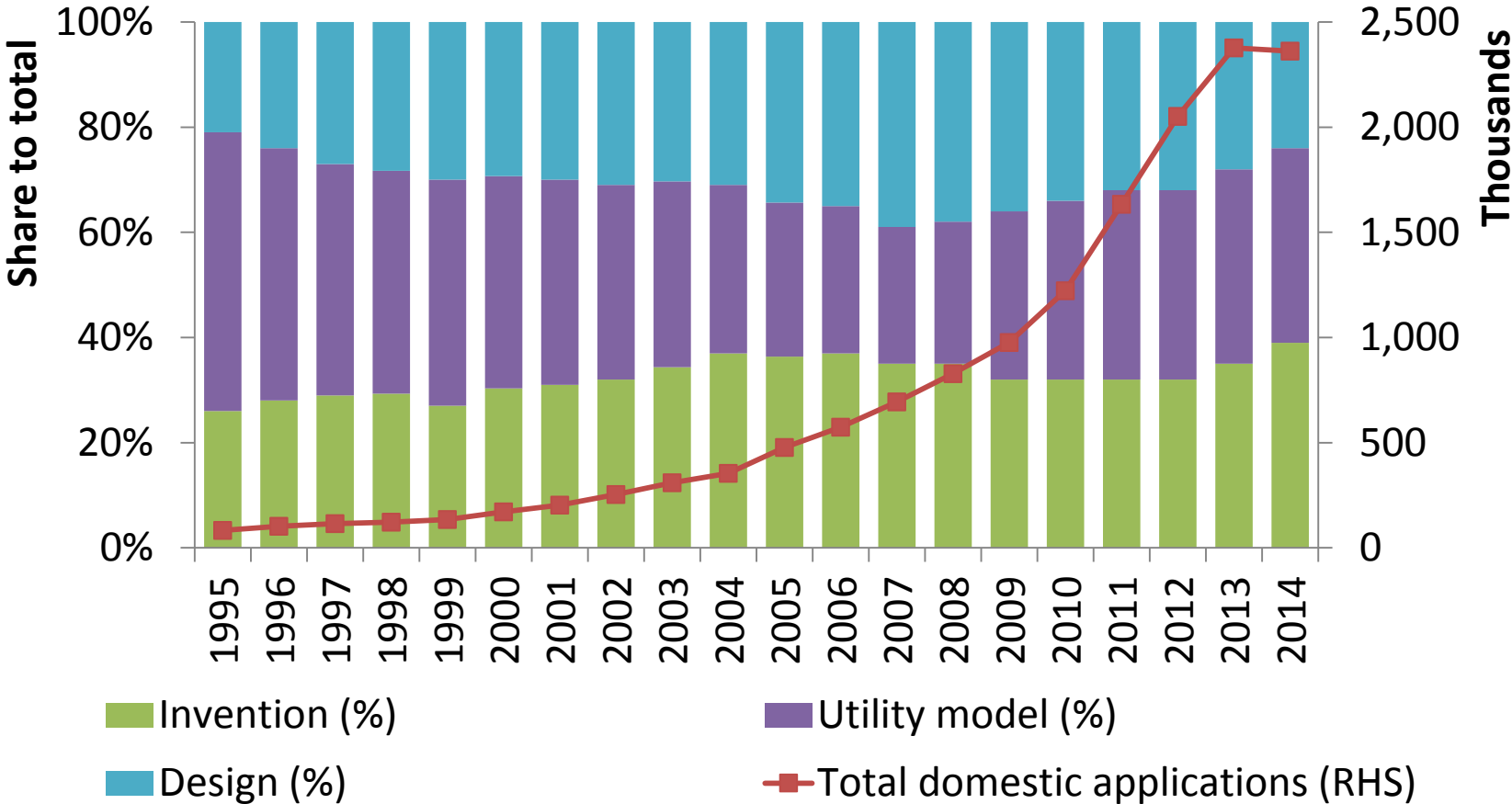
R&D/GDP vs GDP per capita



Note: data for China are from 1995 to 2014, and data for all other countries are for 2014 or the latest year available. Source: OECD database and World Bank.

Number of Chinese patents has exploded

Chinese patent applications

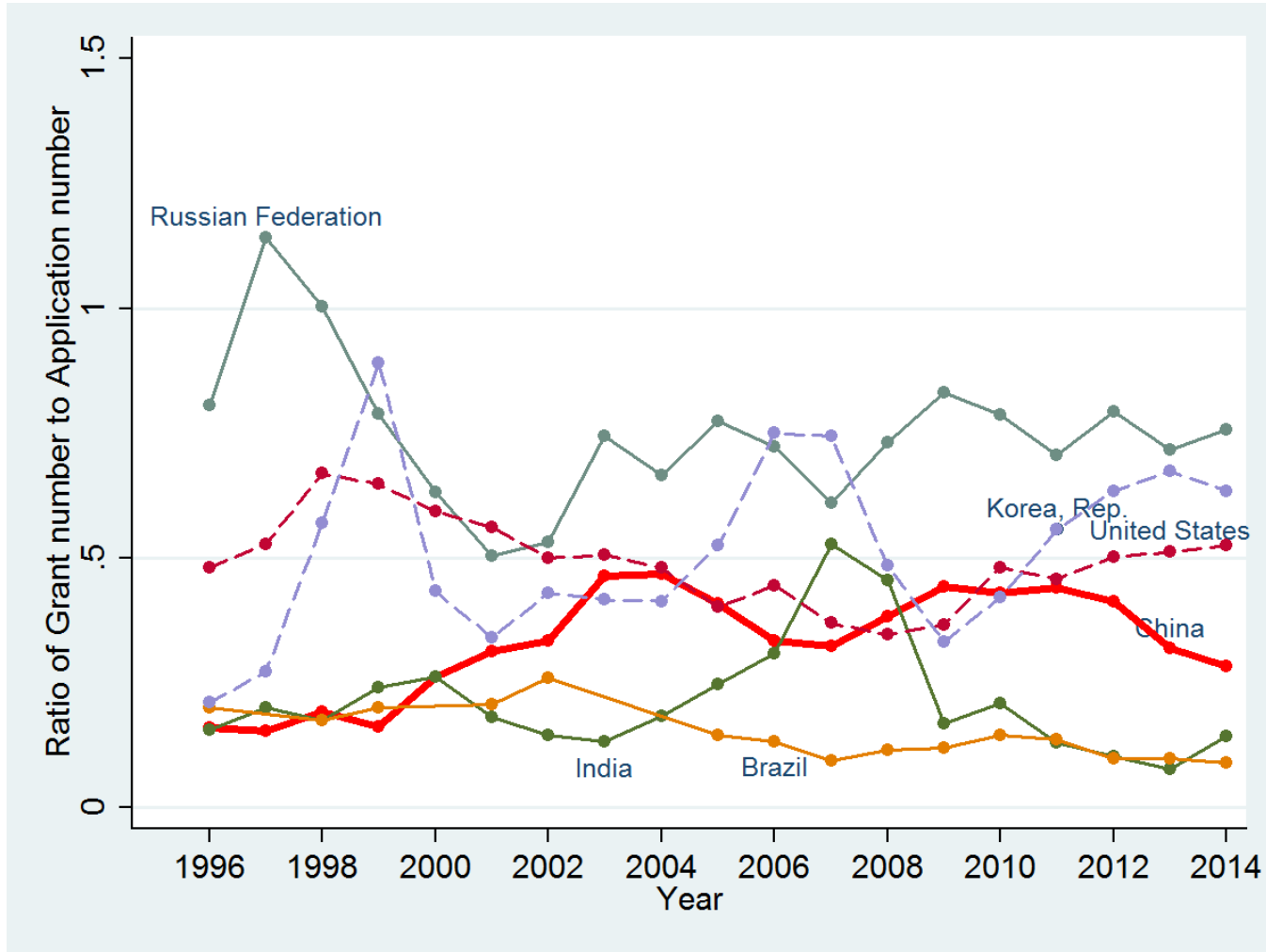


What explains China's innovation growth

- Easy approval?
- Government subsidies?
- Taking advantage of expanding market opportunities
- Spurred by rising wages?

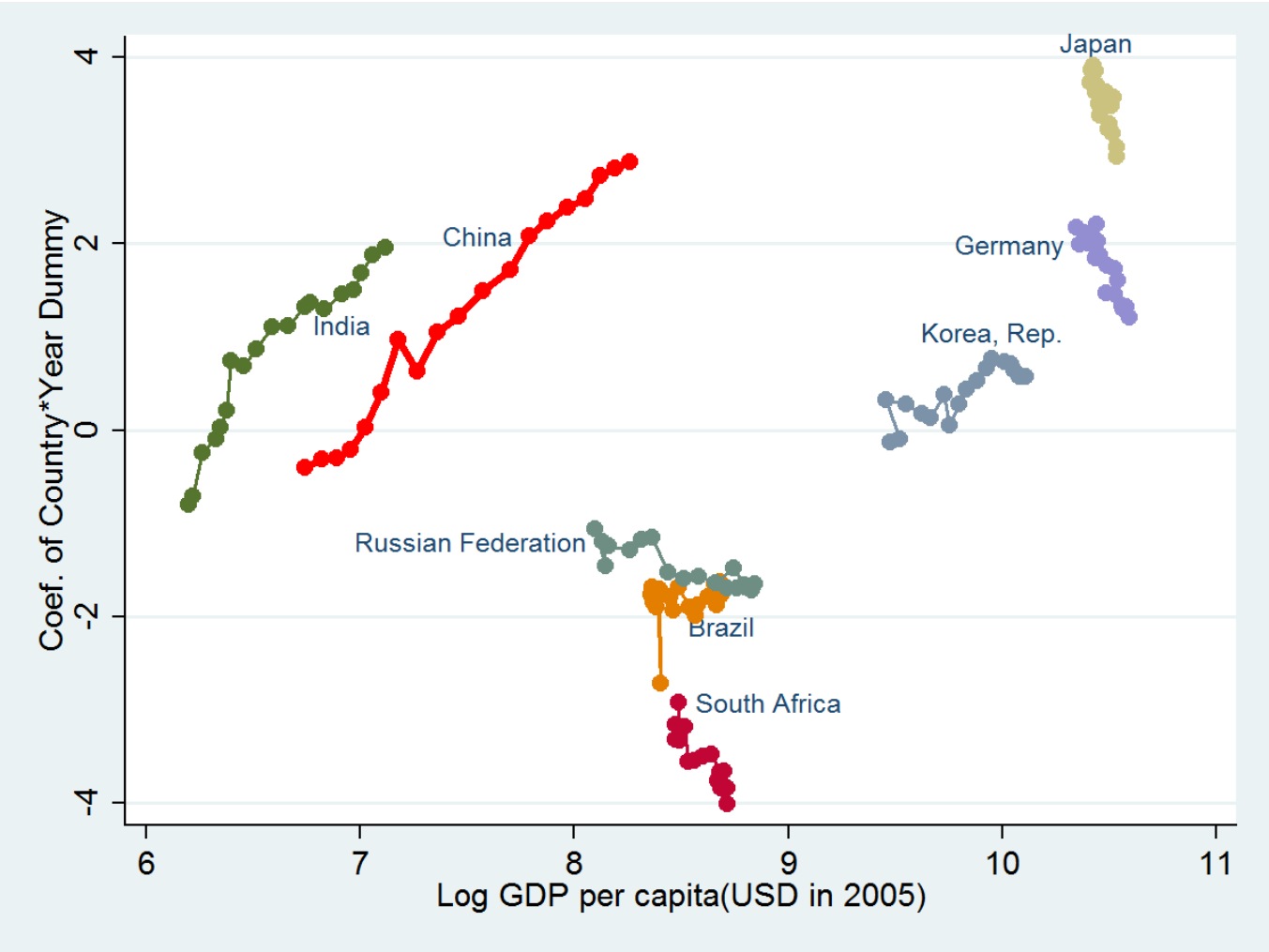
Patent approval rate is not unusually high

Patent Approval Rate in BRIC Countries, the Republic of Korea, and the U.S.



Invention patents in the US show a rising trend

Invention Patents Granted in USPTO by Different Countries

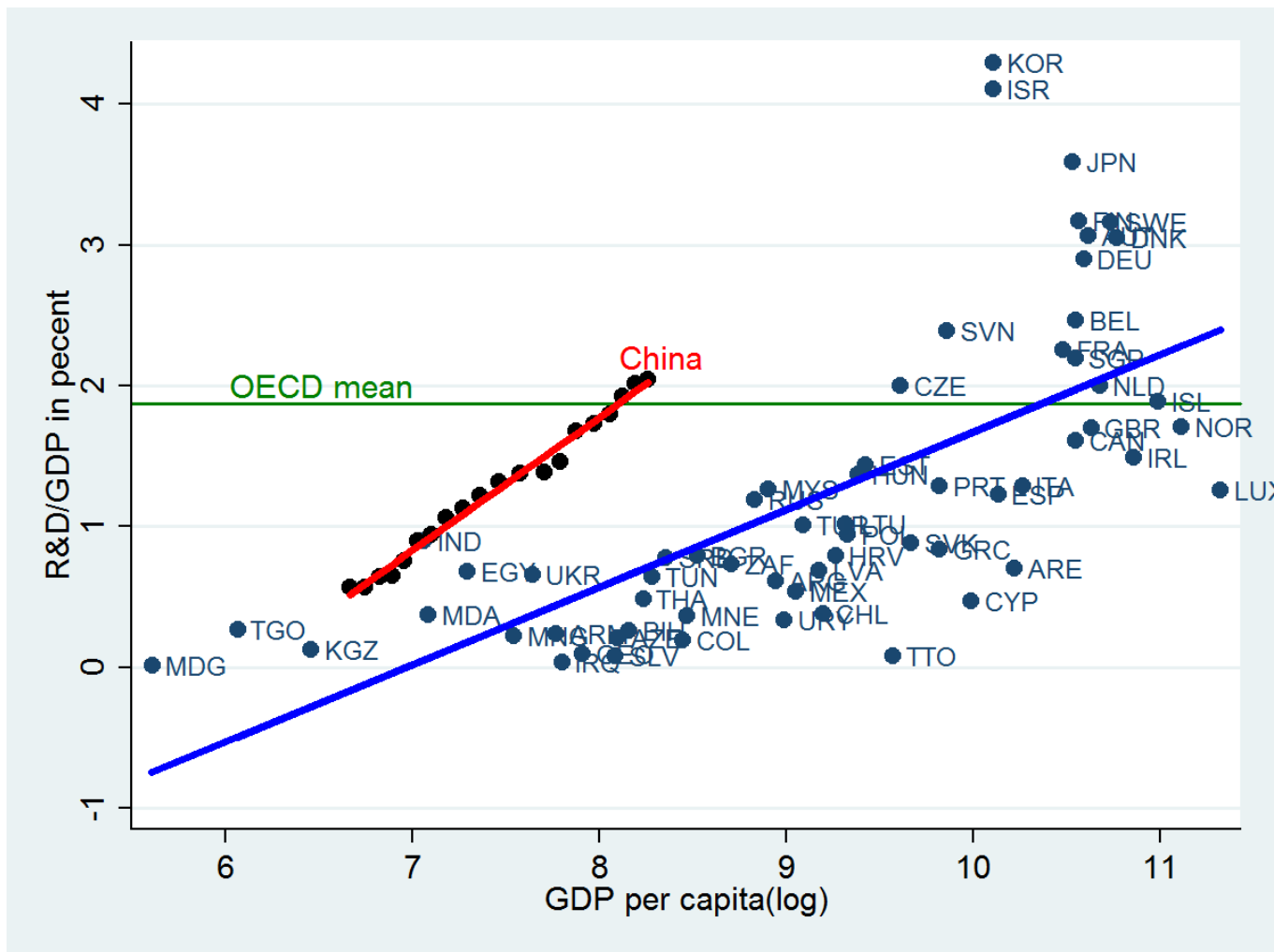


- What drives the rising pace of innovation?
- Statistical analysis

Key results

- Firm size is (+) associated with # of patents
- Export firms are more innovative
- Lower (foreign) tariffs are good for innovation
- Invention patents respond (+) to subsidies
- High tax rate discourages innovation
- Higher cost of capital discourages innovation
- Robust (+) relationship between wages and innovation

The innovation gap with leading countries is still wide



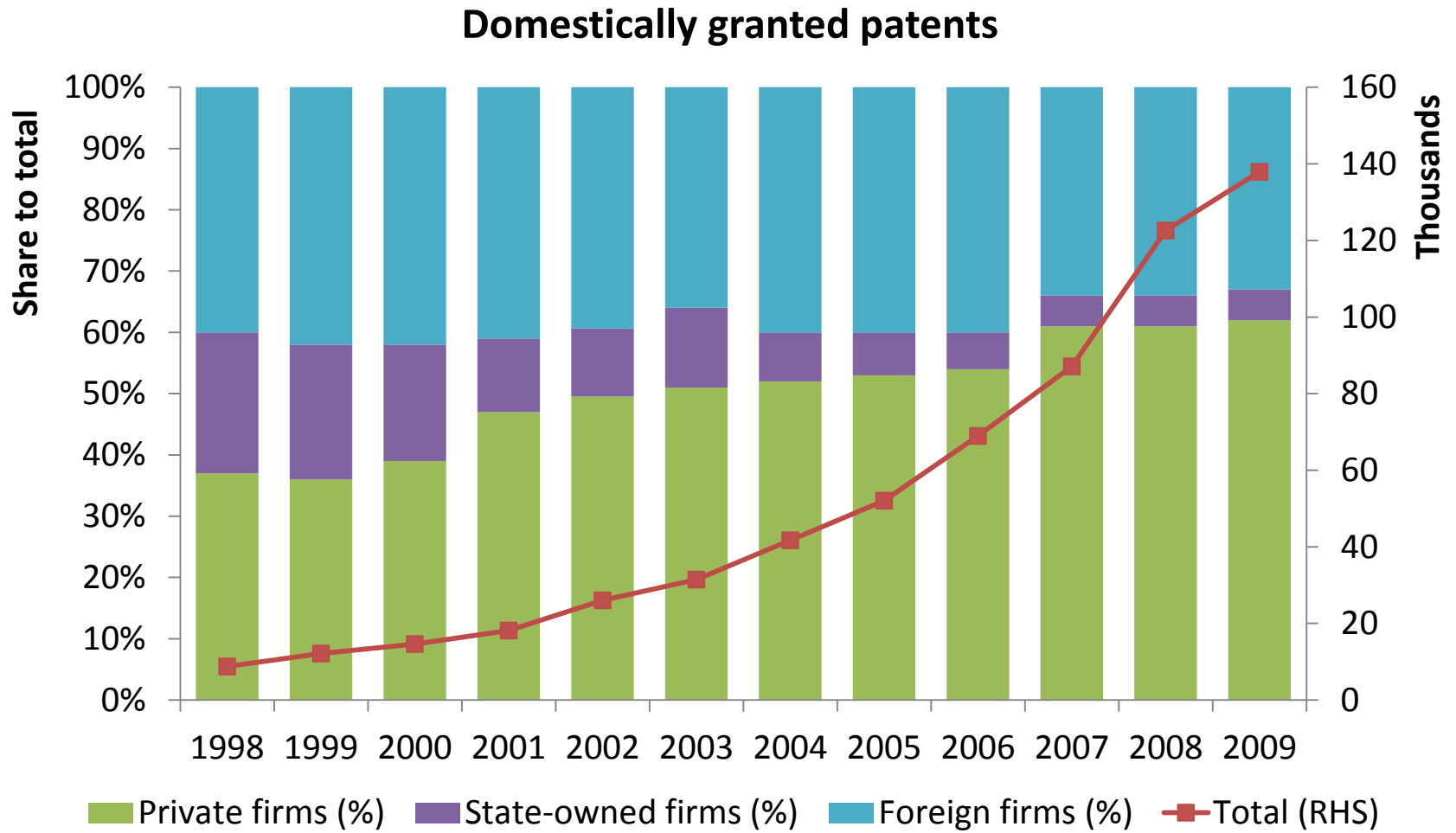
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SOEs are granted more subsidie

Ratio of Subsidies to Sales by Firm Ownership and Size



...but lag behind private firms in patent generation



SOE R&D resources not as efficiently spent

Impact of R&D on Patent Output

Variables	Total	Invention	Utility model	Design
R&D (log)*FIE	-0.006	-0.006	0.002	-0.014**
R&D (log)*SOE	-0.010**	-0.017**	-0.004	-0.014
R&D (log)	0.016***	0.016***	0.013***	0.013***
Sales (log)	0.278***	0.314***	0.259***	0.305***
Constant	-5.558***	-7.135***	-4.979***	-6.414***
Observations	783,229	783,229	783,229	783,229
Firm FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
AIC	298065	92655	190331	134819

Have R&D data only during 2005-2007.

Summary

- The fortune of the Chinese economy matters for the Americans and the world
- **The Chinese economy fortune is at crossroads**
- Can Chinese firms really innovate?
 - Patent application
 - Patent forward citations
- **Drivers of firm innovation:**
 - (i) world market opportunities; (ii) rising labor costs
- Gap with the US, Japan, and even Korea is still huge
- Possible misallocation
 - Subsidy allocation biased in favor of SOEs, but private firms innovate more
 - Structural reforms that level the playing field can accelerate innovations