

The Economics of China

Performance, Structural Change, and Data Part 1



Fall 2020

Growth and Structural Change¹

- What is Gross Domestic Product (GDP)?
 - **GDP** is "the dollar **value of final output produced** during a given time period within the borders of a country or a region".
- What is **Economic Growth**?
 - "Economic growth, in the simplest meaning of the term, is an increase in the total amount of goods and services available".
 - "This is measured by the growth of gross domestic product (GDP)".
 - "Dividing by population gives the amount of goods and services available per individual, that is, GDP per capita".
 - While **GDP growth reflects increases in an economy's productive capacity, growth in GDP per capita reflects increases in average (economic) living standards.**
- "The **(economic) development** process is a gradual but steady and sustained increase in output per capita".

¹Part of this lecture is based on chapters from: Williamson, Stephen D., Macroeconomics, 5th Canadian Edition.

Growth and Structural Change

- In terms of long-run economic growth, how did the Chinese economy perform since the formation of the People's Republic of China 1949?
"China is a certified growth miracle".
 - "China grew rapidly between 1949 and 1978", and continued to grow after the economic transition in 1978.
 - The most impressive period of growth occurred between 2000 and 2010.
 - "Moreover, the acceleration of economic growth coincided with the slowing of population growth, so per capita growth accelerated even more dramatically".
 - "per capita GDP was 15 times in 2010 what it was in 1978".
 - This meant significant improvement in (economic) living standards.

Growth and Structural Change

Table 7.1

Growth of per capita GDP (average annual growth rates, percentage).

	GDP	Population	GDP per capita
1952–1978	6.0	1.9	4.1
1978–2000	9.7	1.3	8.3
2000–2010	10.5	0.6	9.9
2010–2016	7.7	0.5	7.1

Source: *SAC* (2017, 16, 21–37).

Growth and Structural Change

- How is output produced?
 - Usually through a combination of capital input (physical capital, land...) and labour input (workers and their human capital).
- Neoclassical economists have used the following "Cobb-Douglas production function" to express the above statement mathematically:
 - $Y = zK^{\alpha}N^{1-\alpha}$, where α is between 0 and 1.
 - Y is the amount of output that can be produced by an economy in a given period.
 - K is the "amount" of capital input available in the economy in the given period.
 - N is the "amount" of labour input available in the economy in the given period. This includes the number of workers, the time they spend working, and their "human capital" (i.e. knowledge, skills, health...).
 - Theoretically, z is "total factor productivity", which is a measure of the general level of productivity or efficiency in converting inputs to output.

Growth and Structural Change

- Based on the previous production function, we can "decompose" growth in output as follows: $g_Y = \alpha g_K + (1-\alpha)g_N + g_z$
 - g_Y is growth in output (GDP growth).
 - g_K is growth in capital input.
 - g_N is growth in labour input.
 - g_z is "productivity growth".

Growth and Structural Change

- Therefore, how is **economic growth achieved**?
- Output increases through/because of
 - g_K : **Physical capital accumulation** "to equip workers to become more productive". This is achieved through **real investments** in infrastructure, machines, buildings and so on.
 - g_N : **Labour force growth and human capital accumulation**. Population growth usually leads to labour force growth. Labour input can also be increased through increasing the time spent working and through "human capital accumulation" especially by investing in health and education of the labour force.
 - g_z : **Productivity growth**. This can be achieved through technological advancement, improved political environment, better institutions and God knows what!

Growth and Structural Change

- On the side: "productivity growth" or "a measure of our ignorance"?
 - In reality, we can obtain data on changes over time in Y (GDP), and in the physical capital and labour inputs (K and N) and their respective shares (α and $1-\alpha$) for most countries.
 - As a result, we can estimate g_Y , g_K , and g_N .
 - Then, any leftover growth in aggregate output that is not accounted for by $\alpha g_K + (1-\alpha)g_N$ is attributed to g_z and is called productivity growth.
 - However, g_z can also be viewed as just a leftover (a residual) that we don't know much about.
 - One economist sums it up nicely as follows:
 - "the "Solow residual," often interpreted as a measure of total factor productivity (TFP), representing aggregate economic efficiency, but also often viewed as "a measure of our ignorance"—under different assumptions regarding the production function and measurement". (Daude, 2013, p.111).²

²Daude, C. (2013). Understanding Solow Residuals in Latin America. *Economia*, 13(2), 109-138.

Growth and Structural Change

- Numerical Example 1.
- Let's say that $\alpha = 1/3$.
- Last year:
 - Investment led to growth in capital input equal to 4%.
 - There was a significant increase in university and vocational degree holders. This contributed to an estimated growth in the economy's human capital by 3%.
 - Population growth was equal to 1%.
 - There was an estimated productivity growth (or growth in the Solow residual) of 2%.
- What was the growth in output (GDP) last year?
- Note: Assume the economy has a Cobb-Douglas production function and labour input growth = population growth + human capital growth.

Growth and Structural Change

- Numerical Example 1.
- With the assumptions made:
 - $g_Y = \alpha g_K + (1-\alpha)g_N + g_z$
 - $g_Y = (1/3)*4\% + (2/3)*(1\%+3\%) + 2\%$
 - $g_Y = 6\%$.
 - Contribution of growth in capital input $= \alpha g_K / g_Y = 2/9 = 22.22\%$
 - Contribution of growth in labour input $= (1-\alpha)g_N / g_Y = 4/9 = 44.44\%$.
 - Contribution of productivity growth $= g_z / g_Y = 3/9 = 1/3 = 33.33\%$.

Growth and Structural Change

- Numerical Example 2.
- Let's say that $\alpha = 1/2$.
- Last year:
 - Investment led to growth in capital input equal to 8%.
 - There was a significant increase in university and vocational degree holders. This contributed to an estimated growth in the economy's human capital by 2%.
 - Population growth was equal to 2%.
 - GDP growth was 7%.
- What was the estimated productivity growth (or growth in the Solow residual) last year?
- Again assume the economy has a Cobb-Douglas production function and labour input growth = population growth + human capital growth.

Growth and Structural Change

- Numerical Example 2.
- With the assumptions made:
 - $g_z = g_Y - \alpha g_K - (1-\alpha)g_N$
 - $g_z = 7\% - (1/2)*8\% - (1/2)*(2\%+2\%)$
 - $g_z = 1\%$.
 - Contribution of growth in capital input $= \alpha g_K / g_Y = 4/7 = 57.14\%$
 - Contribution of growth in labour input $= (1-\alpha)g_N / g_Y = 2/7 = 28.57\%$.
 - Contribution of productivity growth $= g_z / g_Y = 1/7 = 14.29\%$.

Growth and Structural Change

- We said that China succeeded in becoming a growth miracle. How did China achieve its remarkable economic growth?
- 1. Through **High Levels of Investment**.
 - Since after the formation of People's Republic of China, China has had relatively high rates of saving and investment.
 - Particular jumps happened during the Great Leap Forward, and around/after the years 1992, 2002, and 2009.
 - "There was no precedent for the investment levels of 45% of GDP that China sustained for six years from 2009 to 2014".
 - **"The high rate of investment is the most immediate explanation for China's rapid growth".**

Growth and Structural Change

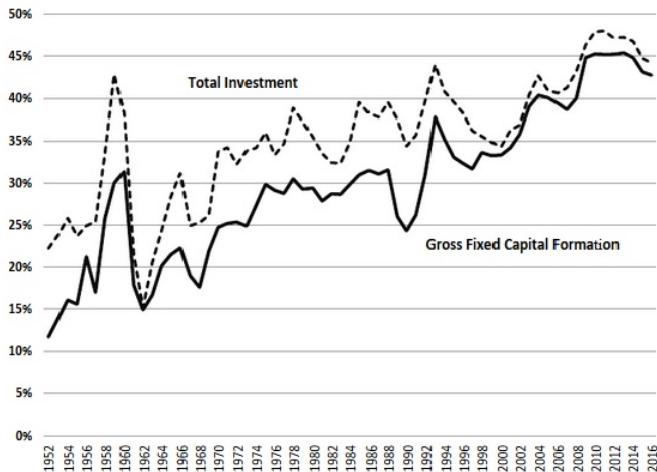


Figure 4.1

Investment as a share of GDP.

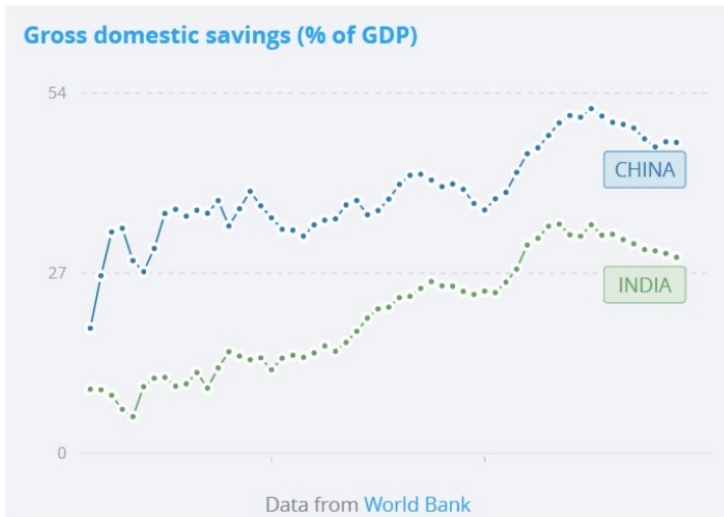
Sources: NBS (1999, 6–7); SAC (2017, 36).

Growth and Structural Change

- "Why is Chinese investment so high?"
 - 1. Chinese saving is high: people, businesses, and government.
 - 2. Investment opportunities are/were abundant.
 - 3. Government policy (to encourage investment).

Growth and Structural Change

- The graph below shows the saving rate in China (and India) between 1963 and 2018.



Growth and Structural Change

- We said that China succeeded in becoming a growth miracle. How did China achieve its remarkable economic growth?
- **2. Labour Force Growth and Investing in Human Capital.**
 - Until recently, "China enjoyed the demographic dividend of having a large and increasing share of the population of working age and a low dependency burden".
 - In addition, "Chinese people were healthier and better educated at the end of the socialist era", compared to 30 years before.
 - This meant that China had a growing labour force with a human capital base to build on and benefit from the high investment rate.

Growth and Structural Change

- We said that China succeeded in becoming a growth miracle. How did China achieve its remarkable economic growth?
- **3. Productivity Growth.**
 - One of the (main) factors contributing to productivity growth in China after economic transition is the way in which the economy opened up.
 - Economic openness policy in China "produced not so much a flood of imports as it did a flood of new ways to produce industrial goods cheaply and efficiently".

Growth and Structural Change

- In summary, what were the sources of China's high economic growth?
- High levels of investment (most important), labour force growth and human capital accumulation resulted in "rapid growth of all factor inputs". In addition, there was "positive TFP (productivity) growth".
 - "Between 1952 and 1978, growth of inputs was fairly rapid".
 - This continued after the economic transformation, and "the major components of growth of the aggregate production function were growing robustly **after 1978: capital grew at almost 10% annually, while labor and human capital grew at almost 2% and 2.7%, respectively**".
 - In addition, **productivity growth** "was positive and significant for China during the 1978–2005 period" **at 3.8%** (Perkins and Rawski, 2008).
- When factors of production **grow rapidly together** "along with positive TFP growth", the result is a "**growth miracle**"!

Growth and Structural Change

- The End of the Growth Miracle.
- The "bad news".
 - "The multiple favorable conditions that supported China's growth-miracle phase logically cannot last forever".
 - "China's working-age population has now plateaued and has begun a slow, steady decline".
 - "the investment rate has declined annually between 2013 and 2016".
 - "This decline seems likely to continue, since changing structure and slowing growth ought to imply that previously profitable investments will become less attractive, and businesses will reduce their investments".
 - "For example, as wages climb rapidly, labor-intensive manufactured exports attract less investment".
 - In addition, "a larger existing capital stock implies that depreciation is bigger and proportional increases in net capital are harder to achieve".

Growth and Structural Change

- The End of the Growth Miracle.
- The "good news".
 - China can still maintain a "sustainable—but no longer miraculous—growth".
 - As growth in physical capital and the labour force slows down, two sources of future growth are human capital accumulation and productivity growth.
 - "China's educational levels are increasing rapidly".
 - "As China's economy moves toward the frontier of highest- productivity workers, it still has the possibility to experience rapid TFP growth".
 - As mentioned, productivity (TFP) growth can be achieved through continuous technological advancement.
 - But we also said that "TFP is a residual, not an automatic pass-through of technological sophistication".
 - "Institutions, structural change, and economic policy choices all affect the size of this residual".

Growth and Structural Change

- The End of the Growth Miracle.
- The success or failure of the Chinese economy in adapting to the post-growth miracle phase can make the difference on:
 - whether the growth miracle phase ends smoothly or abruptly.
 - whether China manages to become a high income country in terms of GDP per capita or gets stuck in the "middle-income trap".