Accounting for China’s Growth

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Questions

1. What has been the main source of China’s remarkable growth?

2. What are the main challenges China faces in sustaining high rates of growth?
What has been the main source of China’s growth since 1978?

Answer: Productivity growth

- Brandt, Hsieh and Zhu (2008)
- Zhu (2012)
<table>
<thead>
<tr>
<th></th>
<th>GDP</th>
<th>K</th>
<th>h</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978-2009</td>
<td>9.48</td>
<td>9.02</td>
<td>1.27</td>
<td>1.64</td>
</tr>
<tr>
<td>1978-1988</td>
<td>9.43</td>
<td>7.88</td>
<td>1.20</td>
<td>2.84</td>
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<tr>
<td>1988-1998</td>
<td>7.75</td>
<td>7.74</td>
<td>1.77</td>
<td>1.27</td>
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<tr>
<td>1998-2009</td>
<td>11.09</td>
<td>11.24</td>
<td>0.87</td>
<td>0.90</td>
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</table>
• By pure accounting, capital stock growth accounts for about half of GDP growth in China
• But, capital accumulation is an endogenous variable determined by changes in both investment rate and in productivity
• Has the growth in capital stock driven by ever higher investment rates or by productivity growth?
Alternative growth decomposition

A decomposition proposed by Hall and Jones (1999), and Kehoe and Prescott (2002):

\[ Y = A^{1-\alpha} hL \left( \frac{K}{Y} \right)^{\alpha} \]

In the long-run, K/Y converges to a constant, GDP growth is driven by growth in A, h, and L, independent of the investment rate.

K/Y may change during the transition or due to changes in investment rate.
## Accounting based on growth theory

<table>
<thead>
<tr>
<th></th>
<th>GDP Growth</th>
<th>K/Y</th>
<th>h</th>
<th>L</th>
<th>TFP</th>
</tr>
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<tr>
<td>1978-2009</td>
<td>9.48</td>
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<td>4.73</td>
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<td>1998-2009</td>
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<td>0.87</td>
<td>0.90</td>
<td>9.17</td>
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</table>
China’s growth has not been driven by investment

• Despite rising rates of investment, returns to investment remain to be high
  – May have declined since 2009
• This would not be possible without high productivity growth
• Even without high investment rates, capital stock would still have grown rapidly due to the high returns to investment
How long can China’s rapid *productivity* growth be sustained?
Productivity gap between China and US

• In 1978, China’s productivity was 3% of the U.S. level

• After three decades of rapid growth, China’s productivity was still only 13% of the U.S. level

• If the rapid growth continues for another two decades, China’s productivity level would be 40% of the U.S. level
Comparison: Productivity growth in Japan and Korea

• In contrast,
  – Japan’s productivity level was 56% of U.S. level in 1950 and 83% of U.S. level in 1975
  – Korea’s productivity level was 43% of U.S. level in 1965 and 63% of U.S. level in 1990
Advantage of backwardness or middle income trap?

• Large productivity gap between China and US:
  – Still plenty of room for adopting and learning best practices and frontier technologies from developed countries

• However, as China’s per capita GDP approaches middle income level, there may be a growth trap
  – Eichengreen, Park and Shin (2012, 2013) show that an economy’s growth may start to slowdown when an economy’s per capita GDP reached $15000 (2005 PPP dollars), independent of productivity gap.
What causes growth slowdown?

GDP growth slowdowns have invariably been associated with slowdowns in aggregate productivity growth.

Duarte and Restuccia (2010) argue that a lack of productivity growth in the service sector is the main reason for the slowdown of aggregate productivity growth in middle income countries.
Labor productivity growth: Portugal

Data source: Restuccia and Duarte (2010)
Labor productivity growth: Japan

Data source: Restuccia and Duarte (2010)
Why service sector productivity growth important for middle income countries?

• Structural change:
  – As income rises, demand for services increases and the service sector’s share of employment and GDP both increase
  – Therefore, slow productivity growth in the service sector will cause the aggregate productivity growth to slow down—Baumol’s Disease (Baumol, 1964)
What about China?
Labor productivity growth: China

Data source: NBS and author’s calculation
What about China?

• Like all the other countries, service sector’s share of employment increases over time
• Therefore, productivity growth in the service sector will be an important determinant of China’s future growth
  – In fact, its importance is already evident by 2004-2005
TFP growth in China
Relative TFP levels (1978 prices)

TFP of Industry-Nonstate is normalized to 1
Relative TFP levels (2011 prices)

TFP of Industry-Nonstate is normalized to 1
Relatively low productivity in nonstate service sector

• Barriers to entry by non-state firms into modern service sectors

• Non-state firms are mainly in traditional services
Rates of Return to Capital in China
Capital formation as % of GDP

State
Nonstate

0.00
0.05
0.10
0.15
0.20
0.25
0.30

Capital formation as % of GDP
Misallocation of Capital

• Disproportional amount of fixed investment allocated to state sectors
• Large differences in rates of returns to capital between the state sectors and nonstate sectors
• Why? To support a certain size of the state sector?
Employment shares by sector and ownership
State sector’s share of total employment
How have the state-owned firms been supported?

• Service sector:
  – Entry barriers, especially in the modern service industries (e.g., financial, telecommunication, transportation)
  – Capital cost differential: lower for the state-owned firms

• Industrial sector:
  – Entry barriers has been reduced significantly, with the exception of upstream industries
  – Even larger capital cost differential
Model

Two sectors, $i = m, s$. Two types of firms $j = \text{state, nonstate}$

$$Y_{ij} = A_{ij}L_{ij}^aK_{ij}^{1-a} \quad (1)$$

$$Y_i = \left( Y_{is}^{\frac{\phi-1}{\phi}} + Y_{in}^{\frac{\phi-1}{\phi}} \right)^{\frac{\phi}{\phi-1}} \quad (2)$$

$$Y = \left( \omega_m Y_m^{\frac{\sigma-1}{\sigma}} + \omega_s Y_s^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}} \quad (3)$$
Factor Allocation and Aggregate TFP

The sectoral and aggregate TFP:

\[ A_i = \left[ \left( A_{is} l_s^a k_s^{1-a} \right)^{\frac{\phi-1}{\phi}} + \left( A_{in} l_n^a k_n^{1-a} \right)^{\frac{\phi-1}{\phi}} \right]^{\frac{1}{\phi-1}} \]

\[ A = \left[ \omega_m \left( A_m l_m^a k_m^{1-a} \right)^{\frac{\sigma-1}{\sigma}} + \omega_m \left( A_s l_s^a k_s^{1-a} \right)^{\frac{\sigma-1}{\sigma}} \right]^{\frac{1}{\sigma-1}} \]
The model parameters are set as follows:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$a$</td>
<td>Labour Share</td>
<td>0.5</td>
</tr>
<tr>
<td>$\sigma$</td>
<td>Inter-sectoral elasticity</td>
<td>0.85</td>
</tr>
<tr>
<td>$\phi$</td>
<td>Inter-ownership elasticity</td>
<td>1.5</td>
</tr>
</tbody>
</table>
Non-agriculture TFP loss due to factor market distortions
What are the main challenges China faces in sustaining high rates of growth?

• Improving productivity in service sector
• Reducing capital market distortions
Further institutional and policy reforms

– Reduce state’s monopoly in key industries and services
  • Energy
  • Telecommunication
  • Transportation
  • Banking
  • Health care
  • Education
Further institutional and policy reforms

– Reduce capital market distortions
Further institutional and policy reforms

– Capital market distortions have increased in recent years (Brandt, Tombe and Zhu, 2013)
  • Financial centralization: where have all the credit cooperatives gone?

– Needs
  • A more decentralized banking system
  • Entry of small private financial institutions
Conclusion

• China’s growth has been driven by productivity, not by rising investment rates

• Lack of capital is still a barrier to growth for the non-state sector

• Future productivity growth in China will depend heavily on productivity improvements in the service sector

• Significant barriers to entry by private firms in the service sector
  – State sector’s employment in this sector has been increasing in recent years