

Asian Tigers Growth Analysis

Reading Notes

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1 Project Plan

1.1 Main Question

Did the Asian Tigers (Hong Kong, Singapore, South Korea, Taiwan) experience drastic economic growth from improved productivity (TFP) or increased investment in capital and labor?

1.2 What I Will Work On

- Download Penn World Table data
- Calculate TFP using growth accounting
- Compare the Tigers with other countries
- Make graphs and run regressions
- Write up findings

2 Key Background Concepts

2.1 Growth Accounting

What it is: Investigating what determines the growth of income per capita in a society. Total output is produced by combining *factors of production*. The economy transforms these inputs into outputs.

The basic formula: $\text{GDP Growth} = \text{TFP growth} + \text{Capital growth} * (\text{weight of K contribution}) + \text{Labor growth} * (\text{weight of L contribution})$

2.2 Capital Accumulation

What it is: A method of expanding the *inputs* of a modern economy by growing and improving physical and human capital. This and TFP are generally the two ways to grow economies, since increasing land relative to # of workers is unrealistic in modern economies.

2.3 Total Factor Productivity (TFP)

What it is: The efficiency of an economy's allocation of resources. Efficiency gains can come from better production *technology*, economies of scale, and stronger institutions.

Why it matters: TFP measures the portion of output growth not explained by growth in traditionally measured inputs of labor and capital (human & physical).

How to calculate it: TFP is calculated by dividing output by the weighted geometric average of labor and capital input, with the standard weighting of 0.7 for labor and 0.3 for capital. A traditional Cobb-Douglas output function looks like:

$$Y = z * K^{\alpha} * L^{1-\alpha}$$

After taking the logarithmic derivative with respect to time, we get

$$\frac{dY}{dt} = \frac{dz}{dt} + \alpha \frac{dK}{dt} + (1 - \alpha) \frac{dL}{dt}$$

The Solow Residual rearranges for TFP growth

$$\frac{dz}{dt} = \frac{dY}{dt} - \alpha \frac{dK}{dt} - (1 - \alpha) \frac{dL}{dt}$$

2.4 Capital Weighting

Given the same data, a higher α will calculate lower TFP growth, attributing more of aggregate growth to capital accumulation.

The standard approach is to set α equal to capital's share of national income. In most developed economies, capital income (rent, interest) accounts for roughly 30% of GDP.

Economists may debate α values for a few reasons.

- The share of capital can change between countries and decades
- Human capital improvements, like workers getting more education, could either be labor quality improvements or TFP improvements.

3 Paper Reading Notes

3.1 The Myth of Asia's Miracle

Author: Paul Krugman

Year: 1994

Main argument in one sentence: Though the leadership and institutions of Asian countries do not resemble those of the 1950s Soviet Union, the reasons for their spectacular economic rise are surprisingly similar in their improvement of capital accumulation rather than TFP.

Main points:

- 1950-60s Soviet economic growth should not be attributed to the communist system's superior efficiency. Rather, extensive growth in employment, education levels, and capital investment explains the rapid output growth.
- Growth accounting analysis using Soviet data, though difficult, found little evidence of efficiency growth in the U.S.S.R. during that period.
- Singaporean data shows a similar radical improvement in employment share, educational standards, and physical capital improvements.
- However, Singapore's economy started with higher efficiency than the U.S.S.R., and therefore has come much closer to Western prosperity.
- Input-reliant growth is certain to slow down by design, and this is happening in Japan.
- There is an absence of convergence in technology, despite greater intellectual border-crossing.
- Therefore, the West shouldn't look towards Asia for the secrets to TFP.

How they did their research: Primarily based on studies conducted by Alwyn Young, Jong-Il Kim, and Lawrence Lau.

Questions I still have: Krugman cites Singapore as the strongest example supporting his conclusion. I'm curious about the other Tigers. Also, this analysis seems to benefit greatly from a larger time perspective, so I am interested in more recent research.

3.2 The Tyranny of Numbers: Confronting the Statistical Realities of the East Asian Growth Experience

Author: Alwyn Young

Year: 1995

Main argument: Unprecedented factor accumulation in Hong Kong, Singapore, Korea, and Taiwan led to manufacturing growth and output growth, rather than growth in total factor productivity.

Methodology:

- Used translogarithmic value-added production function.
- Divided growth into capital and labor aggregate inputs with sub-input categories, factoring out land.
- Capital stock estimated through "standard perpetual inventory approach with geometric depreciation".
- Only included working population from census years to avoid census estimation.

Important numbers/facts:

- Tigers experienced GDP per capita growth rates of around 6-7% from 1966-1990.
- The educational attainment of working populations shifted dramatically.
- Postwar decline in birth rates and rising female labor force participation led to higher labor shares.
- Investment to GDP ratio peaked around 40% in Singapore and South Korea.
- From 1966-91:
 - Hong Kong held an average TFP growth rate of 2.3%, output growth rate of 7.3%
 - Singapore held an average TFP growth rate of .2%, output growth rate of 8.7%
 - Korea held an average TFP growth rate of 1.7% (manufacturing TFP rate of 3%), output growth rate of 10.3%
 - Taiwan held an average TFP growth rate of 2.6%, output growth rate of 9.4%

Additional points:

- Capital deepening in Singapore and Korea: output per unit of effective capital falling.
- Many examples of economies with similar TFP and varying levels of development, which experienced drastically slower growth of output per capita.
- "Neoclassical growth theory, with its emphasis on level changes in income [...] can explain most of the difference between the performance of the [Tigers] and that of other postwar economies."
- Other studies overemphasize TFP growth by:
 - Not separating the agricultural sector, which includes land input in the measure of capital stock.
 - Using surveys that are not representative of manufacturing in Korea.
 - Not accounting for the unusual Taiwanese approach to measuring public sector output.

3.3 The East Asian Miracle (World Bank Report)

Author: World Bank

Year: 1993

Main argument in one sentence:

Main findings:

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-
-

3.4 Industrial Policy, Asian Miracle Style

Author: Reda Cherif and Fuad Hasanov

Year: Fall 2025

Main argument in one sentence:

Main findings:

-
-
-

3.5 The World Bank's *East Asian Miracle*: Too Much a Product of Its Time?

Author: Nancy Birdsall

Year: Fall 2025

Main argument in one sentence:

Main findings:

-
-
-

4 Making Connections

4.1 Why Do They Disagree?

(Different data? Different methods? Different time periods?)

5 My Analysis Results

5.1 Growth Accounting Results

When I calculated TFP, I found:

Hong Kong:

- Total growth:
- From capital:
- From labor:
- From TFP:

Singapore:

- Total growth:
- From capital:
- From labor:
- From TFP:

South Korea:

- Total growth:
- From capital:
- From labor:
- From TFP:

Taiwan:

- Total growth:
- From capital:
- From labor:
- From TFP:

5.2 Comparison to Literature

References

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