Asian Tigers Growth Analysis

Reading Notes

Gregory Park

January 12, 2026

Contents

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: GDP Growth = TFP growth + Capital growth*(weight of K contribution) + Labor growth*(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

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

Author: Nancy Birdsall
Year: 2025
As an author of the 1993 *East Asian Miracle* report by the World Bank, Birdsall reviews the claims made in that report, its critiques and reception, and a modern perspective on East Asian growth.

Around the time the report was being written, the Soviet Union had recently dissolved, and a neoliberal emphasis on democracy and open markets was the zeitgeist. This political context was reflected in the Miracle report's focus on market fundamentals (stability, free trade, minimized corruption) and shared growth. The 1993 World Bank endorsed "export-push" policy, but emphasized its risks and required key institutional traits such as a strong bureaucratic technocracy, which was seen as unique to the Tigers and not easily replicable. The World Bank also undermined industrial policy by calculating that Korea's front-running industry was textiles, rather than industry. Thus, the World Bank has not encouraged other countries to implement industrial policy despite the Tigers' success.

Researchers raised concerns over the role of agriculture in Miracle growth and the true TFP growth rates of the Tigers. However, the TFP dispute was quelled after Singapore and other countries escaped the "middle-income trap" and joined high-income economies. Miracle nations like South Korea also did not support unions and minimum wage policy, and featured mild corruption, straying from the World Bank's market fundamentals. The main critiques of this report argued that the World Bank had understated the centrality of industrial policy in East Asia. Amsden believed the World Bank had downplayed the role of powerful government institutions and could have implemented similar systems in other developing countries.

Birdsall presently believes industrial policy programs still only make sense if macroeconomic stability is secure. There are still many risks in implementing similar industrial policies, given institutional differences between countries. Shared growth, export focus, education levels, and consultative mechanisms between public and private sectors continue to be important. Implementing industrial policy in today's developing economies presents different challenges, including premature de-industrialization. Modern countries could shift focus towards the service sector, but that presents a higher barrier to entry than industrialism in the late 20th century.

3.5 Industrial Policy, Asian Miracle Style

Author: Reda Cherif and Fuad Hasanov
Year: 2025
Question: Is there some action a government of countries like Ghana or Colombia could take that would lead their economy to grow like the Asian Miracle economies?
Context:

- Inspired by Lucas (1988) neoclassical theories of economic growth and emphasis on the role of the state.

- Only 19 economies reached 50% of U.S. real per capita GDP by 2019. The Asian Miracle economies are good representatives of successful economic development.
- Industries have varying degrees of sophistication, with more sophisticated industries, such as manufacturing, experiencing a higher likelihood of market failures.
- Standard growth policies, such as trade liberalization, increasing investment, improving education levels, and business regulations, allow additional market failures slip through.
- Focusing on localized industries to build momentum, rather than boosting all growth factors at once.

TFP:

- Long run TFP growth rates of 2.1% for Korea and Taiwan, and 1% for Tigers overall.
- TFP growth of 2% over decades is instrumental in sustaining a continuous increase in real income, and allowed them to grow without diminishing returns.
- Their high sustained growth did not face diminishing returns over time, so growth cannot be explained purely by capital accumulation.

Principles of Growth:

- Principle 1: Moving domestic resources towards sophisticated industries
  - Though Tigers lacked a comparative advantage, they still went into electronics and automobile industries with little experience.
  - They did not rely on foreign direct investment for this; rather, multinational corporations and high domestic R&D investment.
  - Evidenced by a high number of patents granted in the U.S. for Tiger innovation in these industries.
- Principle 2: Focus on exports and global markets
  - Import-subsidization industrial policies shielded domestic producers from international competition through tariffs/subsidies.
  - Export focus is necessary for reliable market signals.
  - e.g., Korea vs. Malaysia, Hyundai vs Proton

- Principle 3: Accountability for support provided
  - Avoids poor targets such as quantities produced and focuses on the whole industry rather than a national champion.
  - Asian authorities benchmarked against international standards and promoted heavy domestic competition.
  - The state does not know *a priori* which firms would succeed.
- A leading agency tasked with implementing industrial policy
  - Japan's Ministry of international trade/industry, South Korea's Economic Planning Bureau.
  - Must gather sector-specific knowledge about industries, markets, tech, while coordinating wide policy areas, including trade policy, investment in infrastructure/skills, and technology diffusion.
  - Ambitious national goals with political support and competent staff.
  - Autonomy from undue influence (nepotism/protection), accountability vertically and horizontally, and adaptability to political and economic context.
  - Possible without strict adherence to the rule of law, respect for private property, or absence of corruption.

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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