



YOUR LOGO



ECONOMIC GROWTH MODELS

EE463 Globalization and International Development

FACULTY OF ECONOMICS

THAMMASAT UNIVERSITY

Module 2

Module outline



- 01** Experiences in Economic Growth
- 02** Determining Factors of Growth
- 03** Growth Models

- 04**
- 05** Conclusion
- 06** Conclusion



EXPERIENCES IN ECONOMIC GROWTH

ECONOMIC GROWTH

is contingent upon:



- **factor accumulation:** increasing the size of the capital stock and/or increasing the labor force
- **productivity growth:** improving efficiency and introducing technological change

Two countries, different experiences

- Thailand



- Zambia



Thailand

Indicator	1970	2020
GDP per capita	\$929	\$7,189
Life expectancy	54 years	69 years
Infant mortality (per 1,000 births)	103	12
Literacy rate	80	94



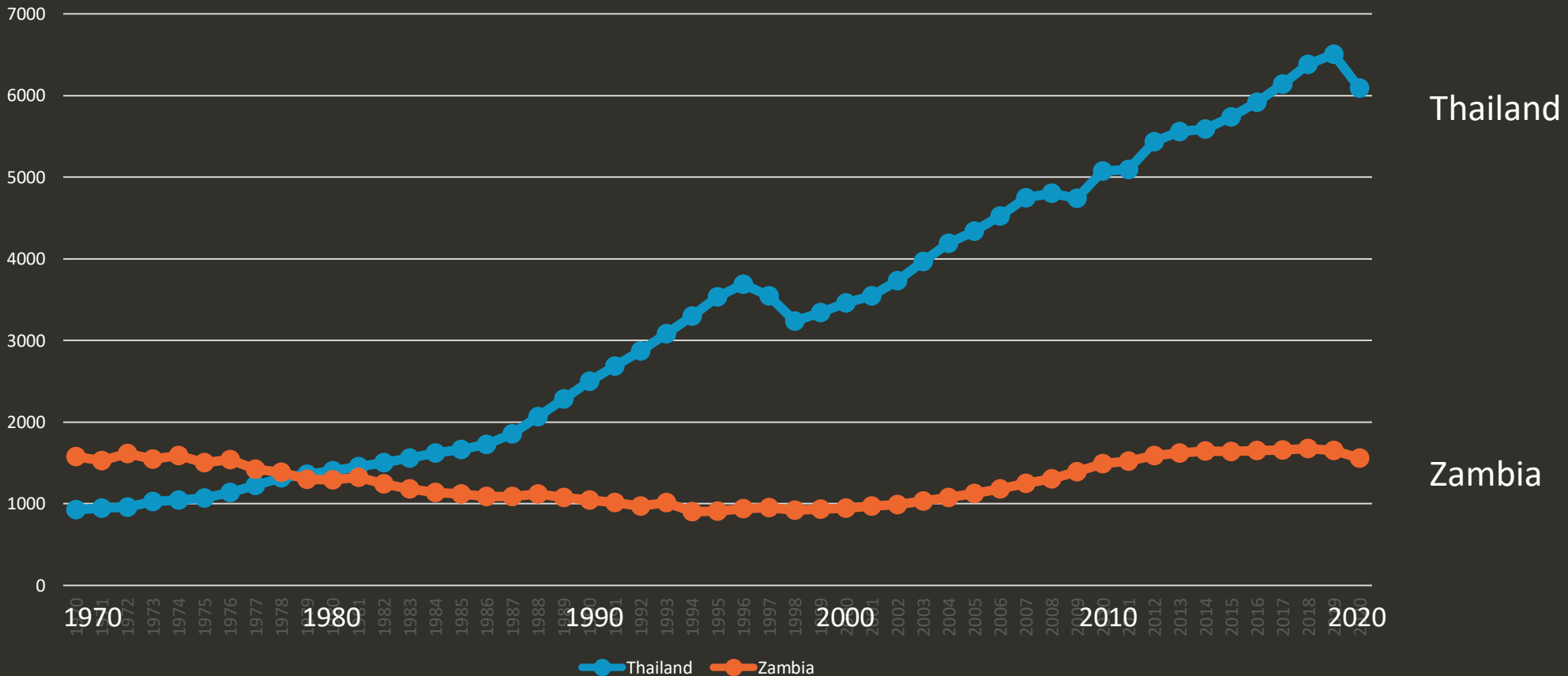
Zambia

Indicator	1970	2020
GDP per capita	\$1,581	\$1,051
Life expectancy	45 years	45 years
Infant mortality (per 1,000 births)	126	86
Literacy rate	48	71

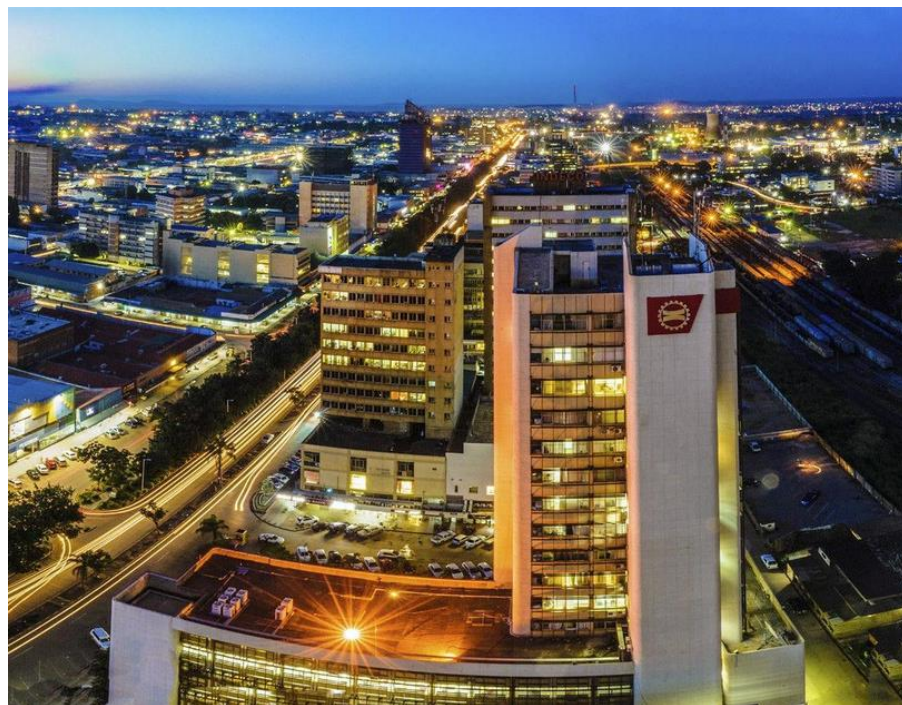


Economic growth comparisons

GDP per capita, constant US\$ 2010



Source: World Bank Open Data



Economic growth experiences

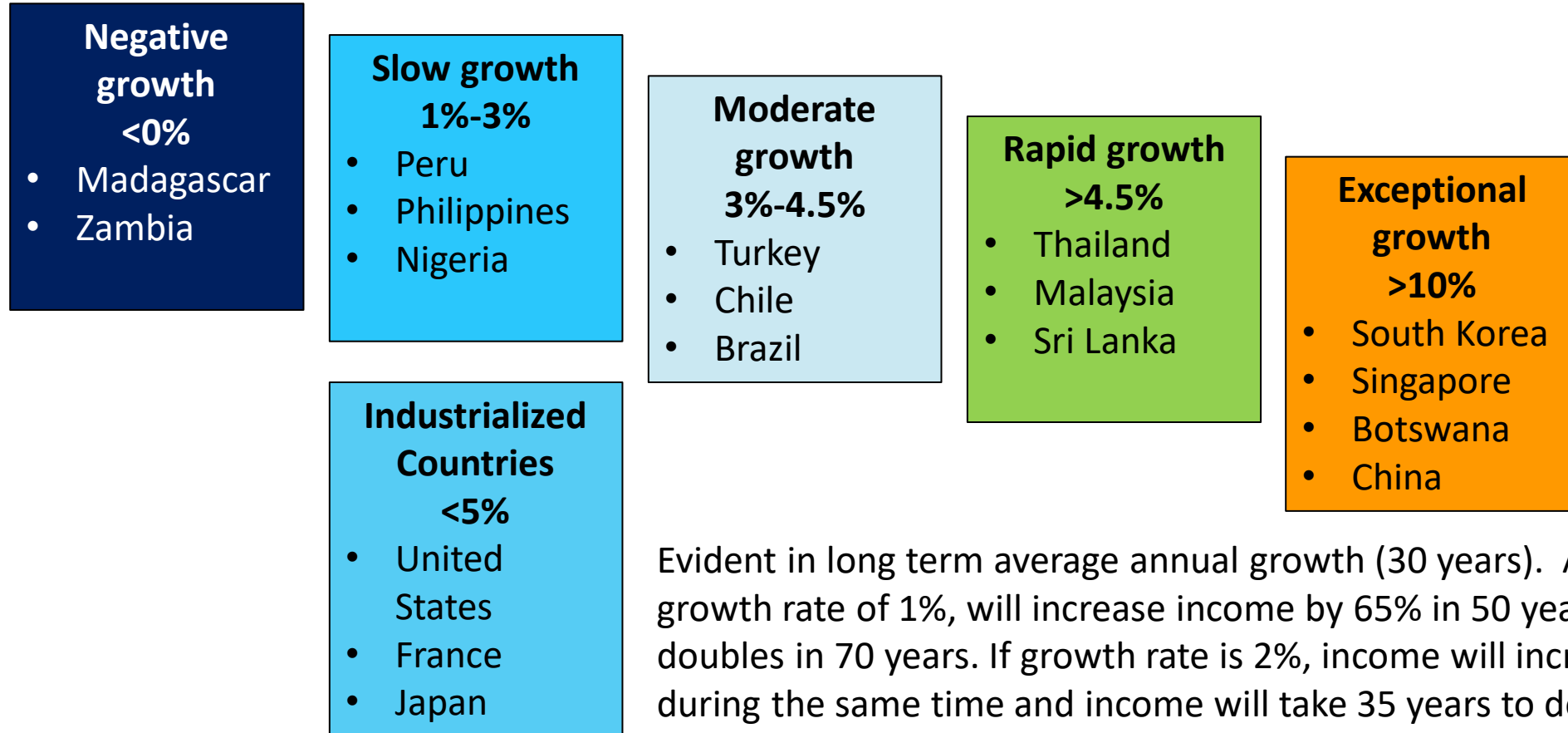
Economic growth across countries are different:

- Rapid growth of East Asian countries within the last 50 years
- Economic stagnation in African countries; few signs of growth
- Economic revival of Eastern European countries
- Economic decline of former Soviet Russian states

Rapid economic growth is a relatively recent phenomenon. Until 500 years ago, most people in the world were poor – food, clothing, shelter, nutrition and health care were rudimentary.

Despite gains from economic growth worldwide, a majority of the world's population, however, still remain poor.

Differences in economic growth



Evident in long term average annual growth (30 years). An average growth rate of 1%, will increase income by 65% in 50 years, and income doubles in 70 years. If growth rate is 2%, income will increase by 270% during the same time and income will take 35 years to double).



DETERMINING FACTORS OF GROWTH

Economic Growth and Development

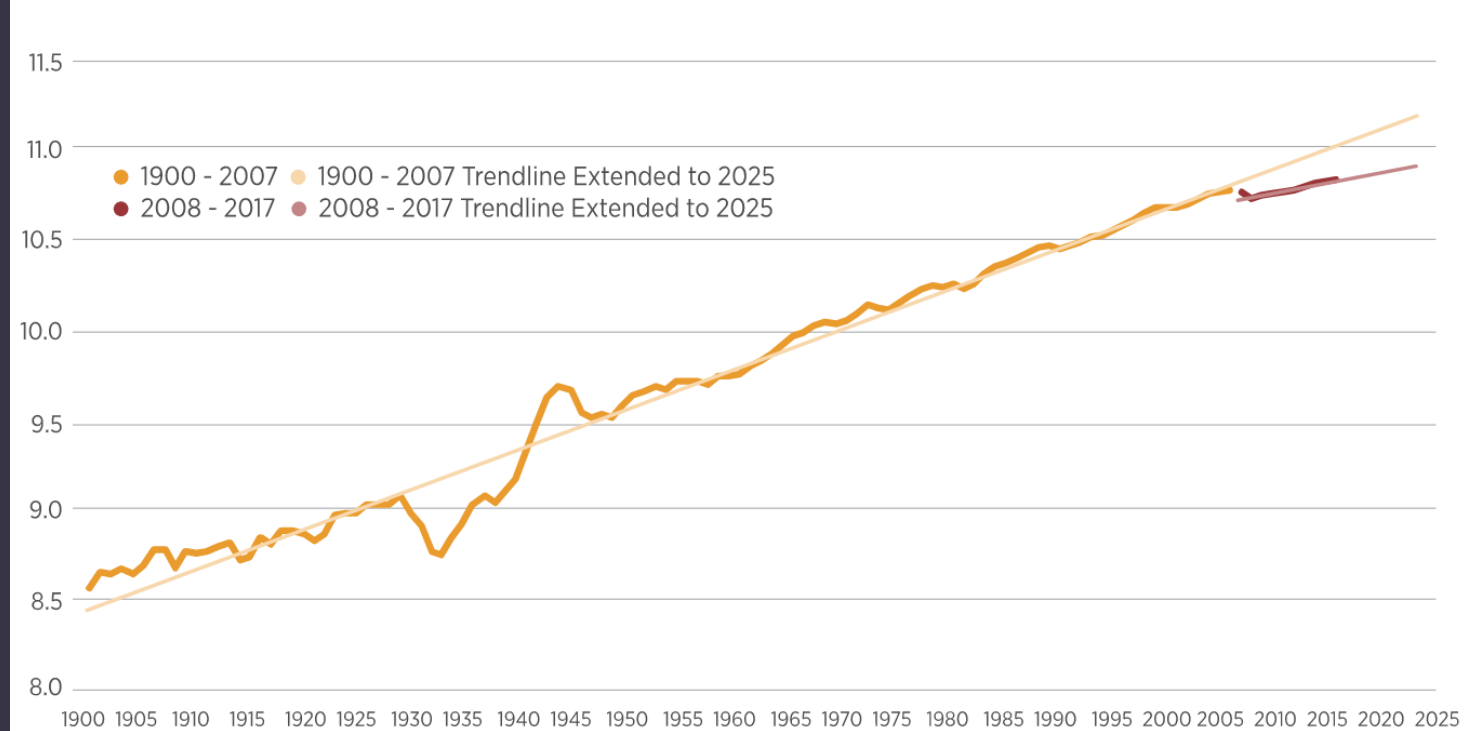
Why are some countries rich? poor?

- *Long-run economic growth* may be the single most fundamental explanation of why countries become rich

Examples

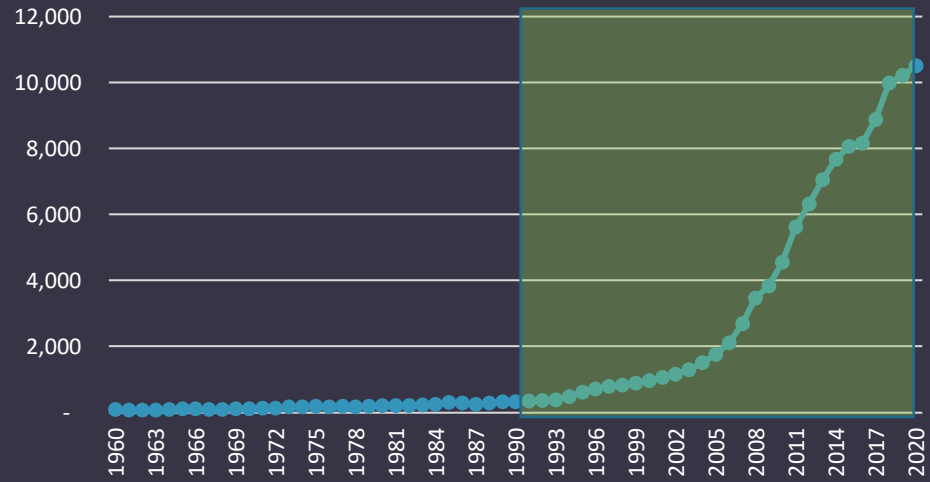
United States, starting 1900
Japan, 1950-1990
South Korea, starting 1970
Taiwan: starting 1980
Singapore: starting 1980
China: starting 1990

U.S. Real GDP Per Capita (1900 - 2017)

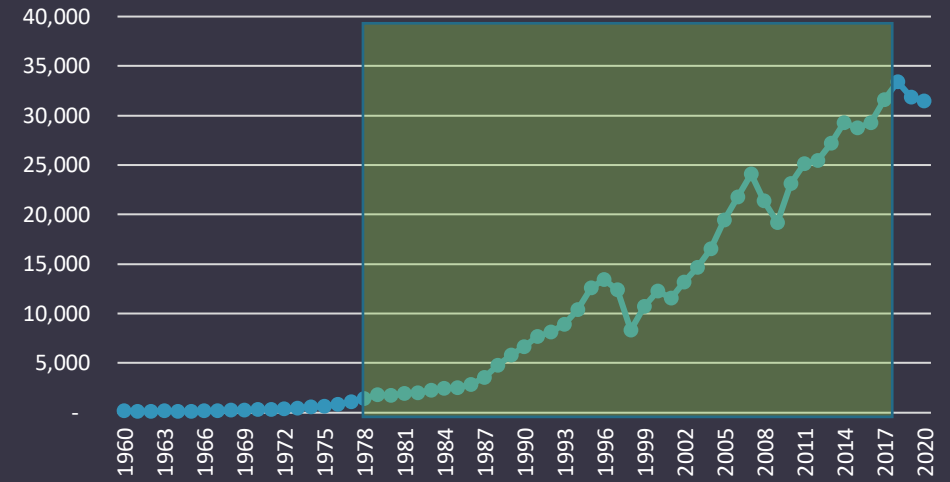


Source: Data from 1929 to 2017 is from the U.S. Bureau of Economic Analysis (BEA). Data from 1900 to 1928 is adapted from the 2018 Maddison Project Database.

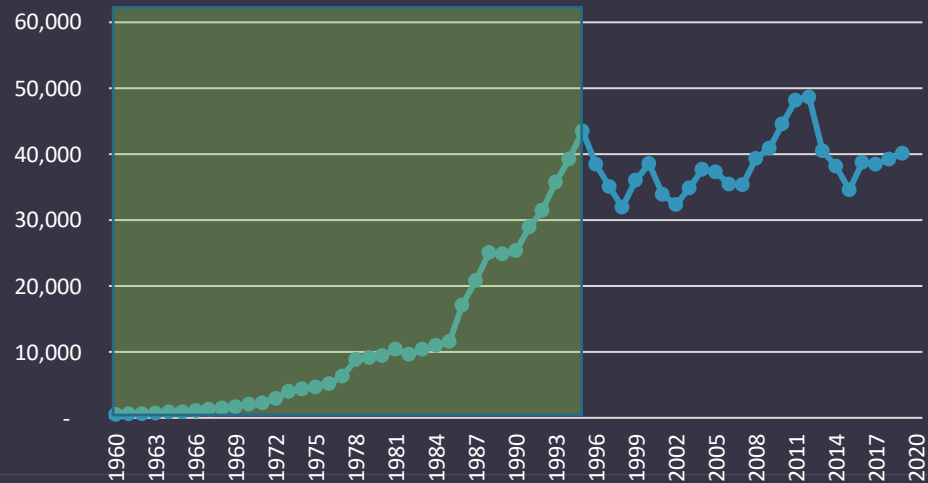
China



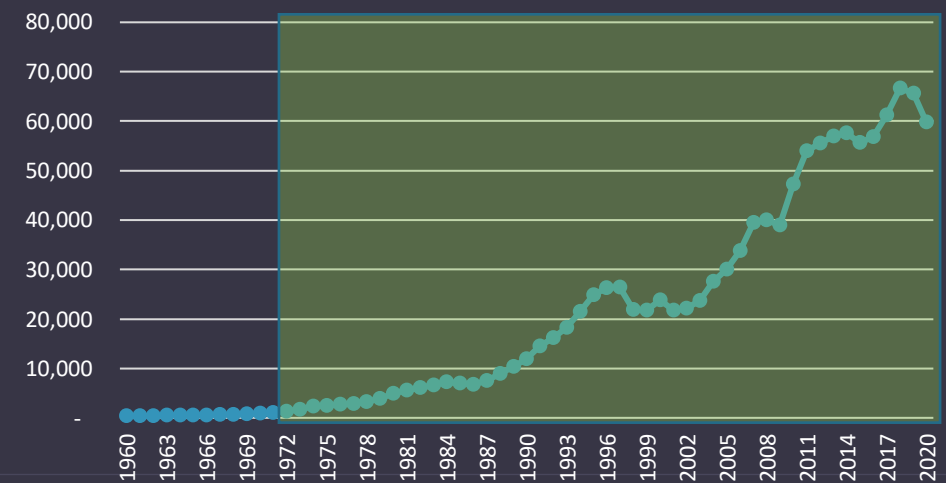
Korea, Rep



Japan



Singapore



Determining factors of economic growth



Macroeconomic and political stability

- Democratic Republic of Congo (1990-1992): suffered inflation (2,800%) due to civil war and social conflict
- Cambodia, Lao PDR and Viet Nam (1960s-1980s): post war social conflicts; isolated from the outside world
- Sub-Saharan Africa (late 1990s): cross-border and civil war
- The Balkans (late 1980s): conflict led to genocide and ethnic cleansing in Bosnia
- The Asian financial crisis of 1998: Negative growth for South Korea, Malaysia, Thailand and Indonesia

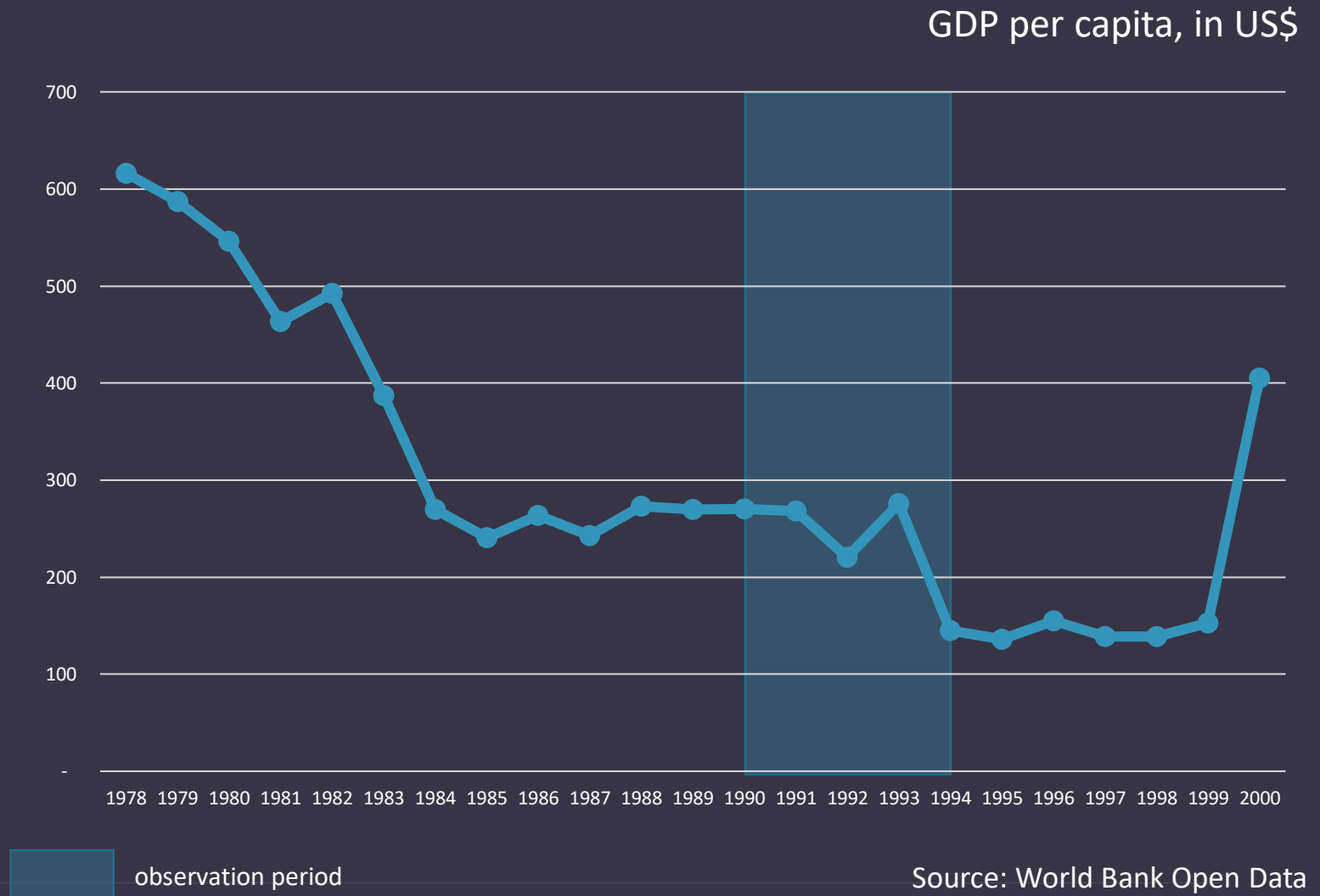


Case study: Congo, 1990-1994

Decline in economic growth: Democratic Republic of Congo

During 1990-1992, Congo suffered inflation (2,800%) due to civil war and social conflict

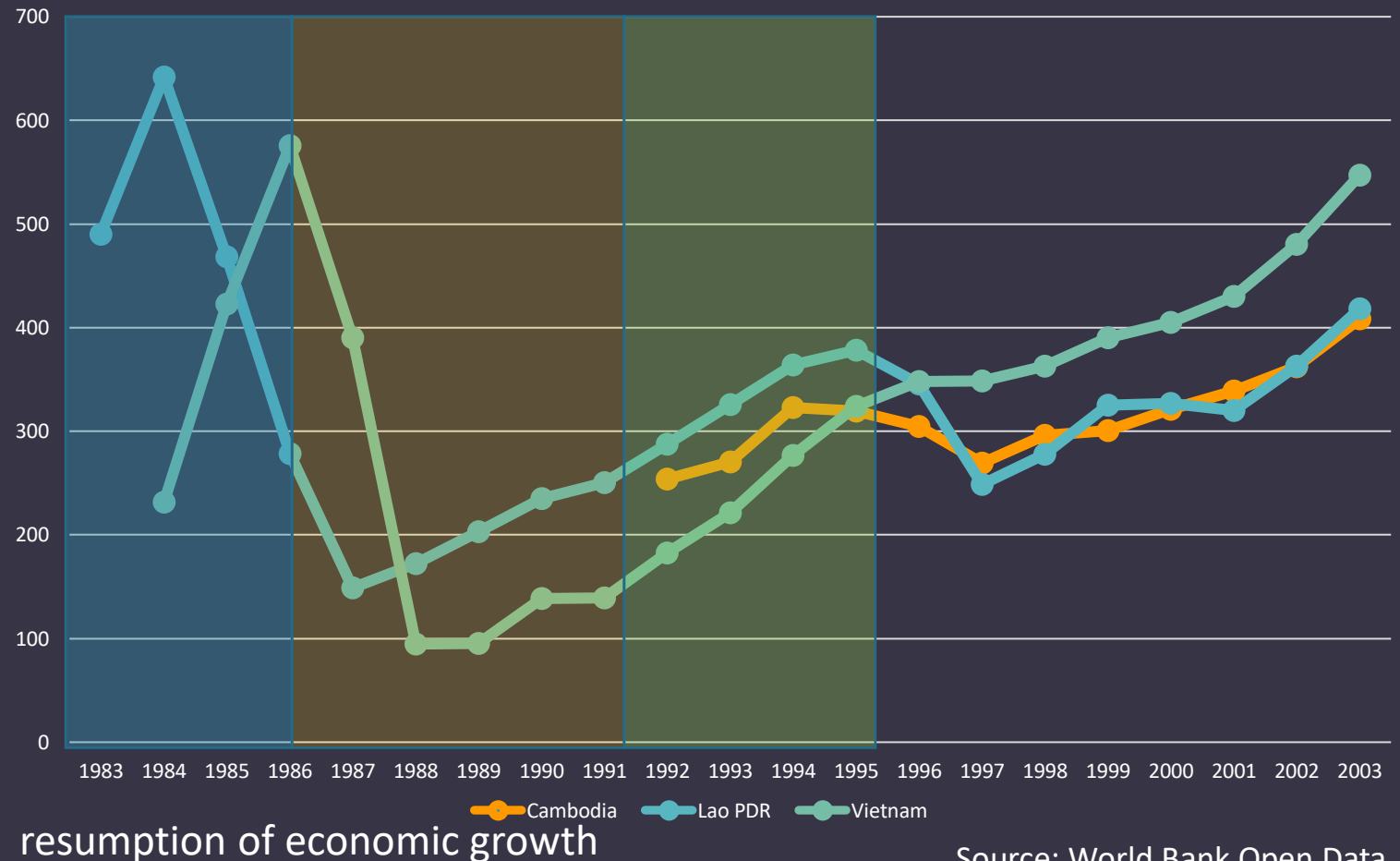
Lowest growth rate occurred in 1994 (-4%) before resuming growth the following years



Case study: Cambodia, Laos and Vietnam

Post war isolation, conflict and reform, 1980s-1990s)

After suffering from social conflicts (1970s-80s) and isolation (1980-86), the region embarked on economic reforms and resumed economic growth

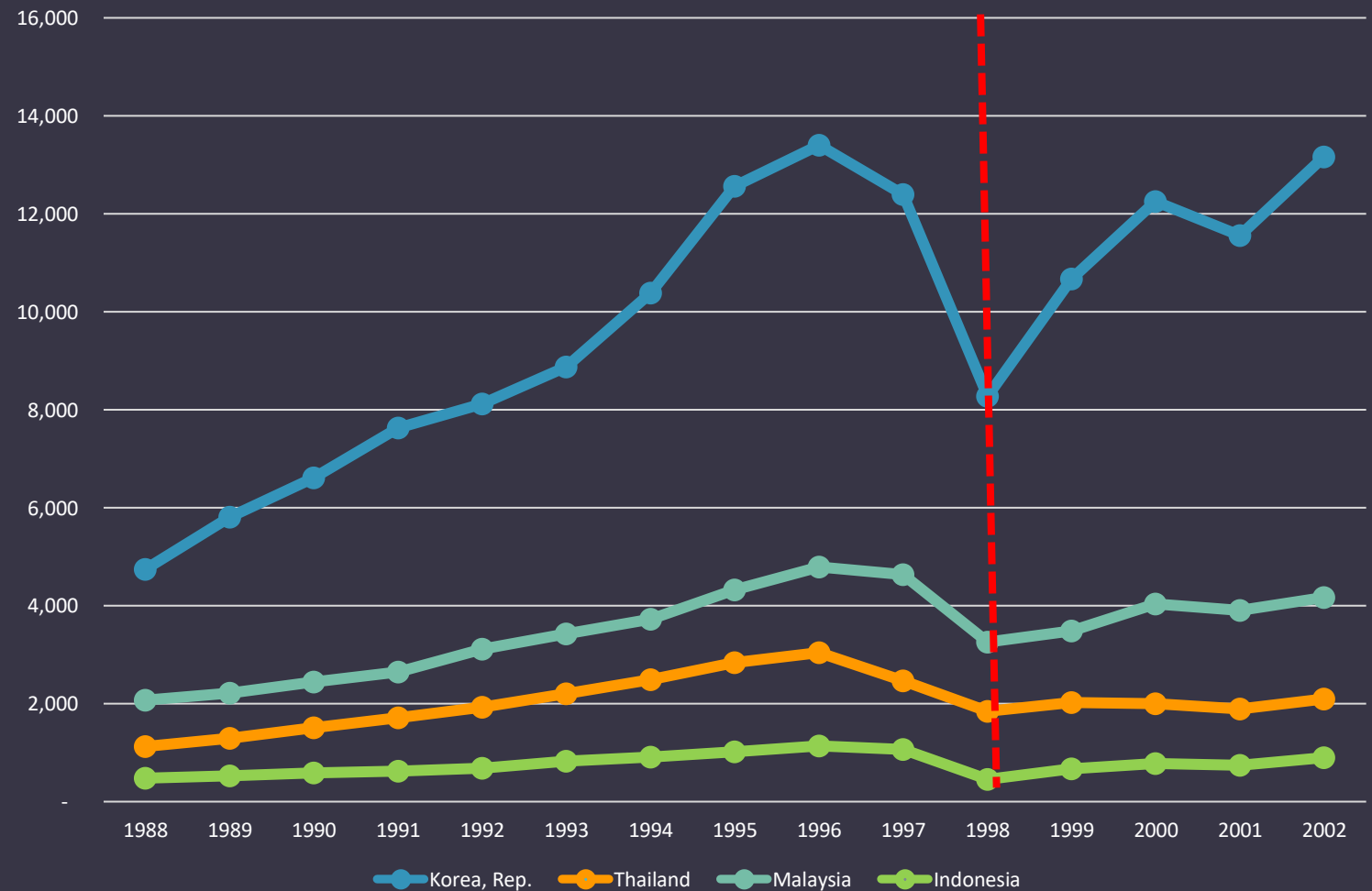


Source: World Bank Open Data

Case study: Asian financial crisis 1998

The Asian financial crisis spread quickly from Korea, Thailand and other countries in East and Southeast Asia

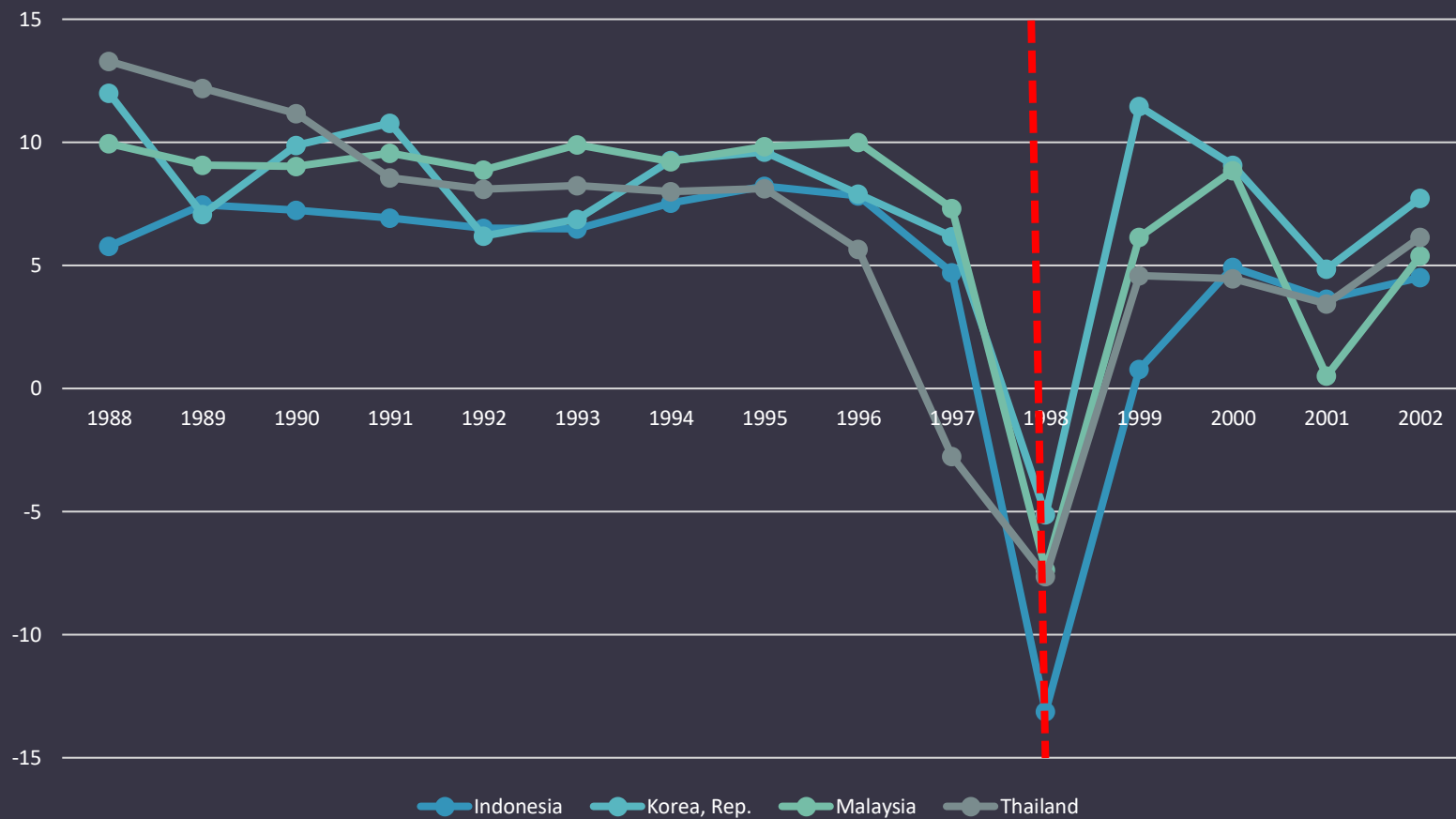
GDP per capita fell drastically for South Korea, Malaysia, Thailand and Indonesia in 1998 before rebounding in 2000



Source: World Bank Open Data

GDP growth for select countries

The economic contraction is indicated in GDP growth figures for South Korea, Malaysia, Thailand and Indonesia in 1998



Source: World Bank Open Data

Investments in health and education

Health

- Healthy workforce = productive workforce (can live longer)
- Access to affordable health care facilities, clean water and sanitation
- Disease control, reproductive maternal and child health programs



Investments in health and education

Education

- Skilled workforce = productive workforce
- Need a good mix of vocational and educational training programs
- Supply of needed skills attracts investments
- High returns to education (including girls'); however it is a long term investment



Effective governance and institutions

- Positive relationship between economic growth and the strength of the rule of law
- Strong institutions needed to manage financial systems, build health and education systems, ensure trade and govern legal systems
- Good governance improves the investment climate by reducing risks and increasing profitability
- Strong legal systems help settle commercial disputes in predictable, rational manner
- Low level of corruption reduces costs of investment



Favorable business environment

- Private individuals and firms make various decisions regarding saving, investment, education and job opportunities
- Businesses will need a healthy/conducive environment, which includes a strong legal system, access to financial systems/resource, and adequate physical infrastructure
- Most business decisions are based on government regulations and policies such as taxes, subsidies, penalties, benefits, permits and license

Most business decisions are based on government regulations and policies such as:

- Taxes
- Subsidies
- Penalties
- Benefits
- Permits
- Licenses

Trade, openness and growth

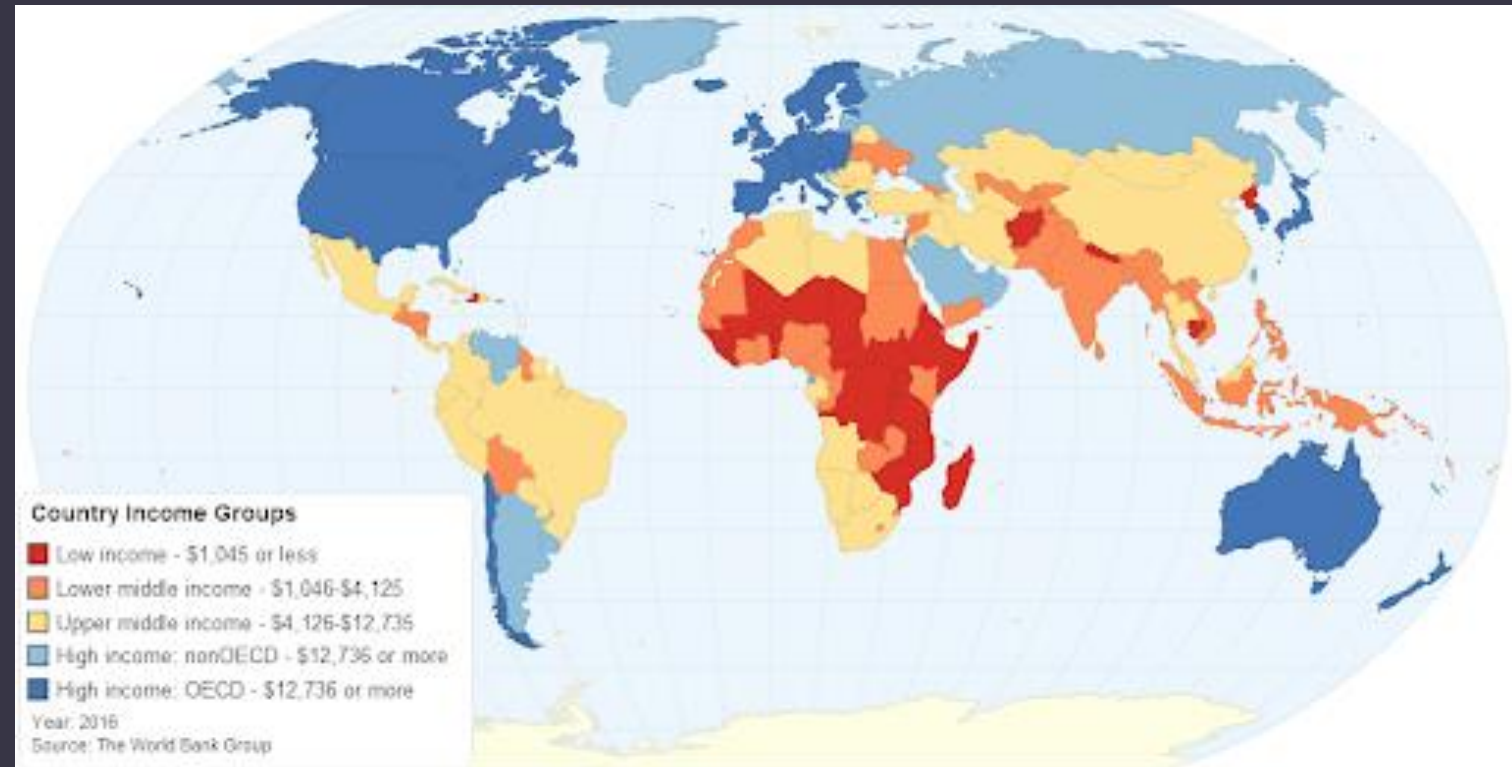
- Trade encourages countries to accumulate physical and human capital and by increasing productivity
- Outward-oriented policies encourage export promotion; examples of countries applying export-oriented policies: South Korea, Taiwan Singapore, Malaysia
- Inward-oriented policies encourage import substitution; examples of countries applying import-substitution policies are Brazil and Argentina



Favorable geography

- Most of the poorest countries are located in the tropics (mainly Sub-Saharan Africa)
- Tropical areas are prone to spread of disease and erratic climate
- The presence of natural resource endowment alone does not guarantee economic growth

Most advanced industrialized countries are located in temperate and subtropical zones, between the Tropic of Cancer and Tropic of Capricorn





YOUR LOGO



COFFEE BREAK

Enjoy your 15' pause



YOUR LOGO

GROWTH MODELS

Basic, Harrod-Domar and Neoclassical Growth Models

5 important equations and relationships

$$Y = f(K, L)$$

$$\Delta K = I - (dK)$$

$$S = I$$

$$I = sY$$

$$\Delta L = nL$$



Capital (K) can be money, equipment, infrastructure; capital **depreciates** (d) in time; therefore it has to be maintained or replaced. To maintain or increase capital, **investments** (I) are needed.



Investments come from **savings** (S), or **income** (Y) from peoples' wages that are not consumed; if the **savings rate** is s, the savings = sY (which is invested); wages come from **labor** (L); increase in labor is the population rate multiplied by L

Basic Growth Model

- Output is a function of capital and labor
- Increase of capital depends on investments minus depreciation of capital
- Investment comes from savings; savings are derived from income times the saving rate
- Increased income will therefore increase savings, which will increase investments
- Increased investment will increase capital stock
- In the long run this causes growth in output

Y = output = income

K = capital

ΔK = capital increase

d = capital depreciation

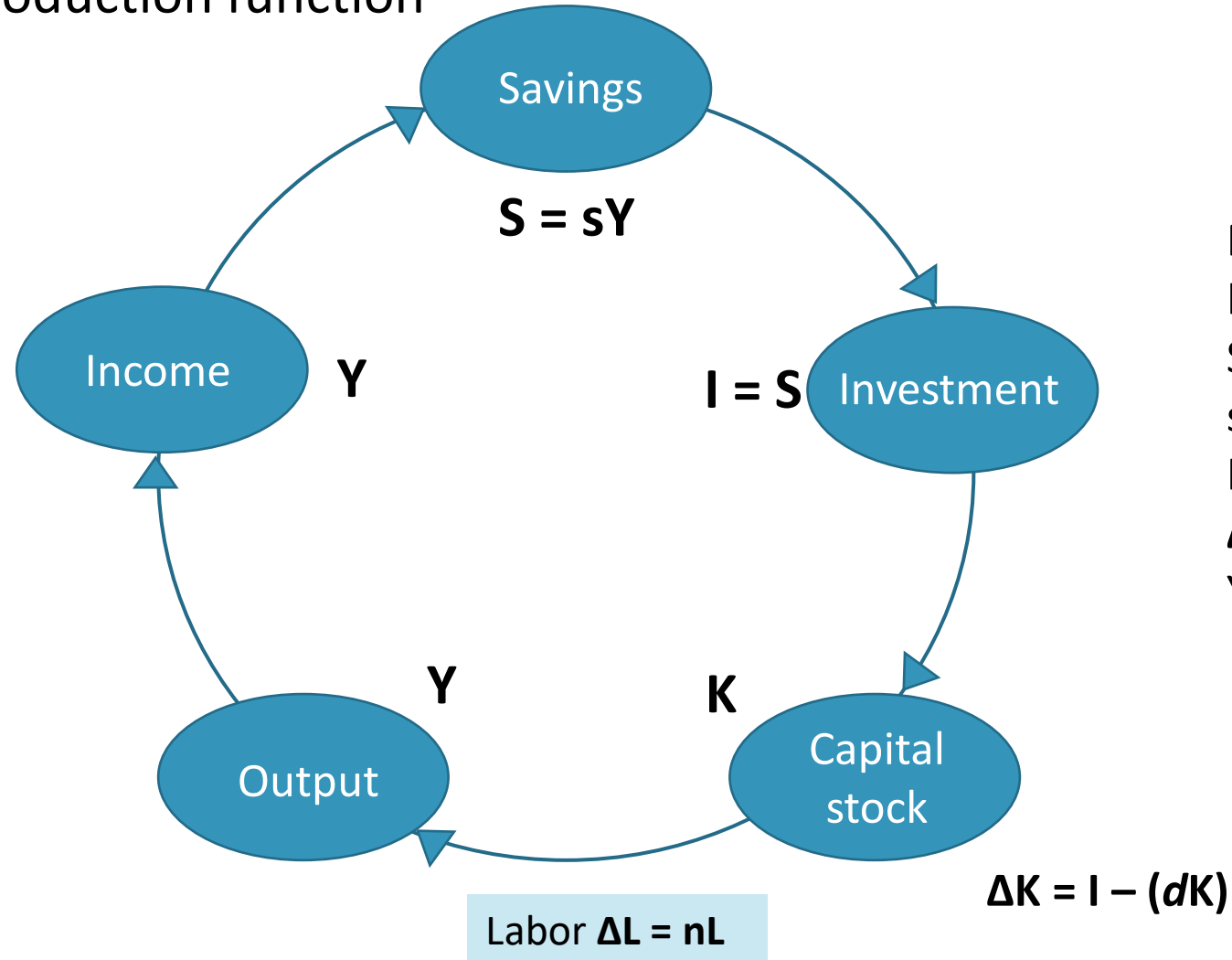
L = labor

S = savings

s = savings rate

Basic Growth Model

The aggregate production function



Notes:

I = investment

S = savings

s = saving rate

K = capital

ΔK = capital increase

Y = output = income

Harrod – Domar Growth Model

- Based on work by Roy Harrod (UK) and Evsey Domar (US); examines the relationship between growth and capital requirements
- Output is assumed to be a linear function of capital; uses a capital-output ratio
- Growth requires a right mix of capital and labor; equals the increment of output divided by the total output
- The lower the ICOR, the better (capital becomes more productive)

Incremental capital-output ratio
used to measure the productivity
of capital; determines the impact
of additional capital

$$v = K/Y$$

$$\Delta Y = \Delta K/v$$

$$g = \Delta Y/Y = \Delta K/Yv$$

whereby:

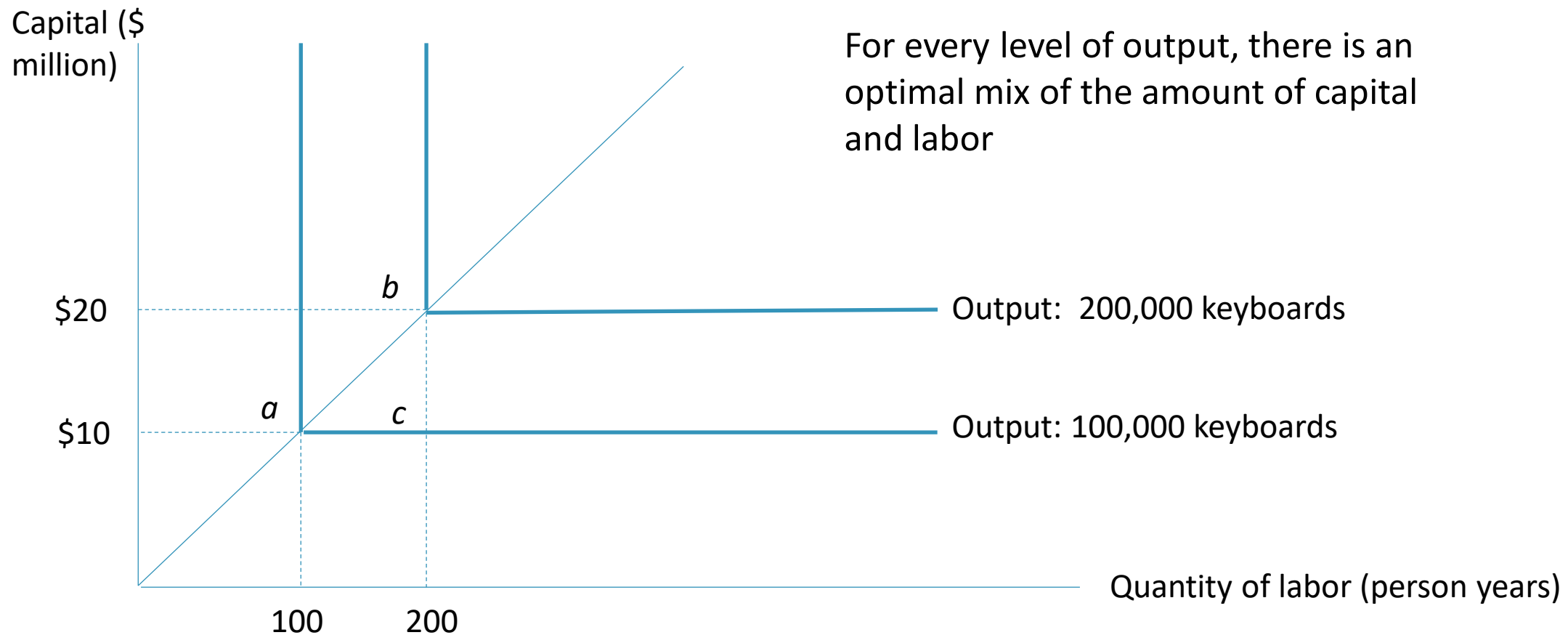
g = growth

v = capital-output ratio

K = capital

Y = output

Harrod – Domar Growth Model



Harrod – Domar Growth Model

- Harrod and Domar view: capital created by investment is the main determinant of growth
- Since investment = savings, countries that save more will experience higher economic growth
- With ICOR, the growth rate can be predicted by adding incremental capital/investment

Harrod – Domar Growth Model

Strengths

- Simple, data requirements are small and outcome is easy to estimate
- Focuses the importance of savings
- Estimates are fairly accurate in the short term

Weaknesses

- Not all investments are productive
- Does not take into account external economic shocks
- Not reliable for long term estimates
- Assumes that relationships between labor, capital, and output are fixed and grow at the same rate
- Does not take into account productivity growth

Neoclassical Growth Model (Solow)

- Developed by Robert Solow, who views that in reality, the relation between capital, labor and output is not fixed;
- Output is a function of capital per worker
- More investments (capital) per worker will increase worker output; however it will give diminishing returns
- Change in capital stock is equal to savings minus capital depreciation

Neoclassical Growth Model (Solow)

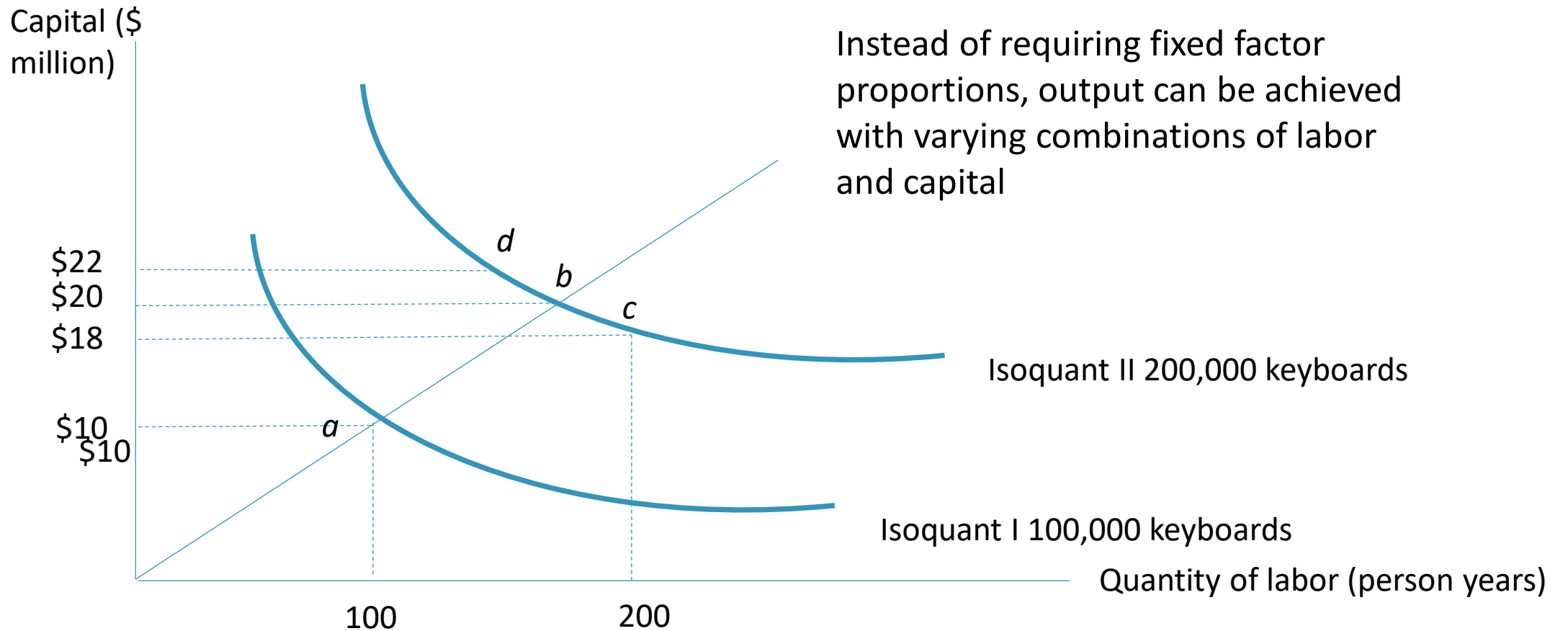
Assumptions

- The population grows at a constant rate, n
- All workers in the economy save a constant proportion, s
- All firms in the economy produce output using the same production technology that takes in capital and labor as inputs
- Capital stock (K), change in capital stock (Δk), the rate of capital depreciation (d) and investment (I) are linked together

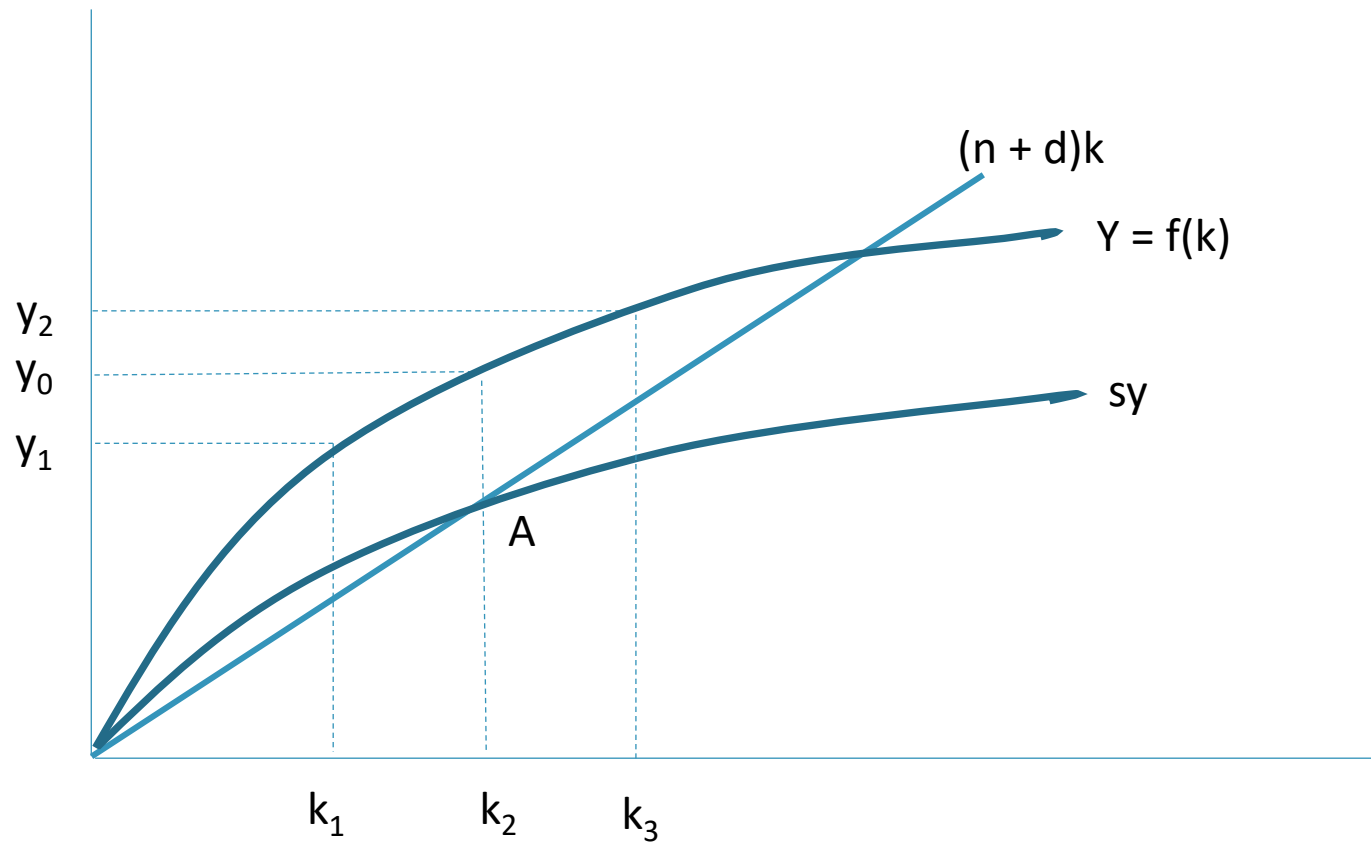
$$\Delta k = sy - (n + d)k$$

Change in capital stock is equal to savings minus capital depreciation

Neoclassical Growth Model (Solow)



Neoclassical Growth Model (Solow)



A is the only point wherein the amount of new savings sy is exactly the same as the amount of capital depreciation; A is therefore the steady state of capital worker and output per worker

Neoclassical Growth Model (Solow)

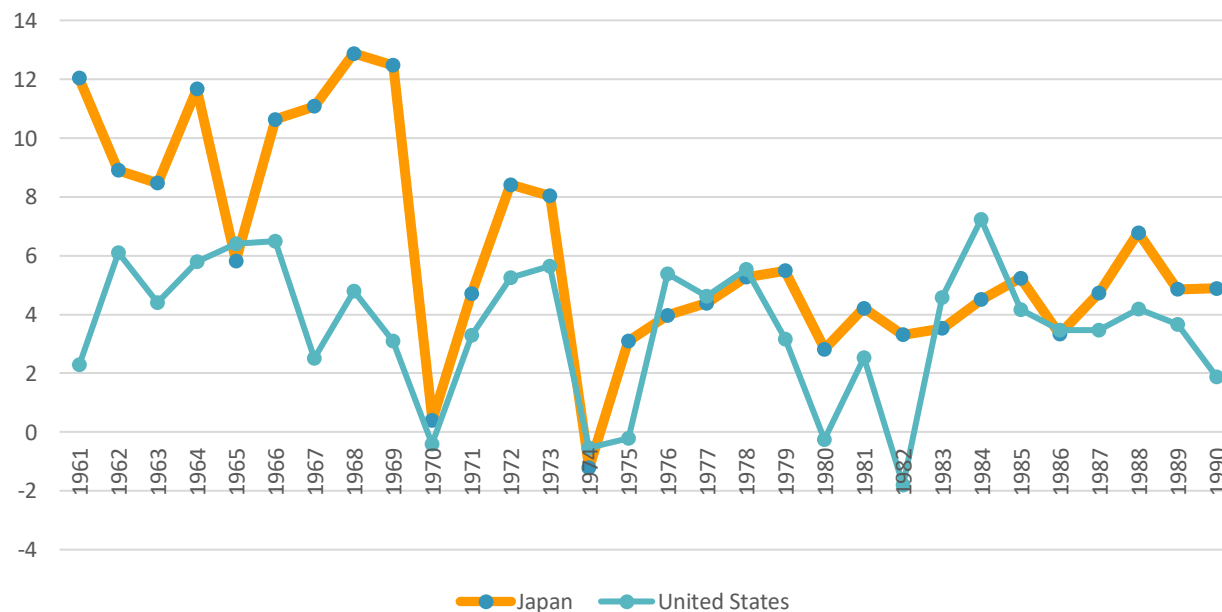
- The Solow model: useful for analyzing the relationships between savings, investment, population growth, output and economic growth
- Once an economy reaches its long run potential level of income and economic growth matches population growth, sustained increase in income is unlikely (known as the *steady state*)
- Introduction of technological change will increase productivity, therefore raising the production function

What the Solow diagram tells us

Higher income countries have relatively lower growth rates; lower income countries tend to have the potential to achieve higher growth rates
Growth rate tends to slow down as incomes increase
Therefore incomes of low income countries can catch up with high income countries (convergence model)

Convergence Debate

- Higher income countries have relatively lower growth rates; lower income countries have the potential to achieve higher growth rates

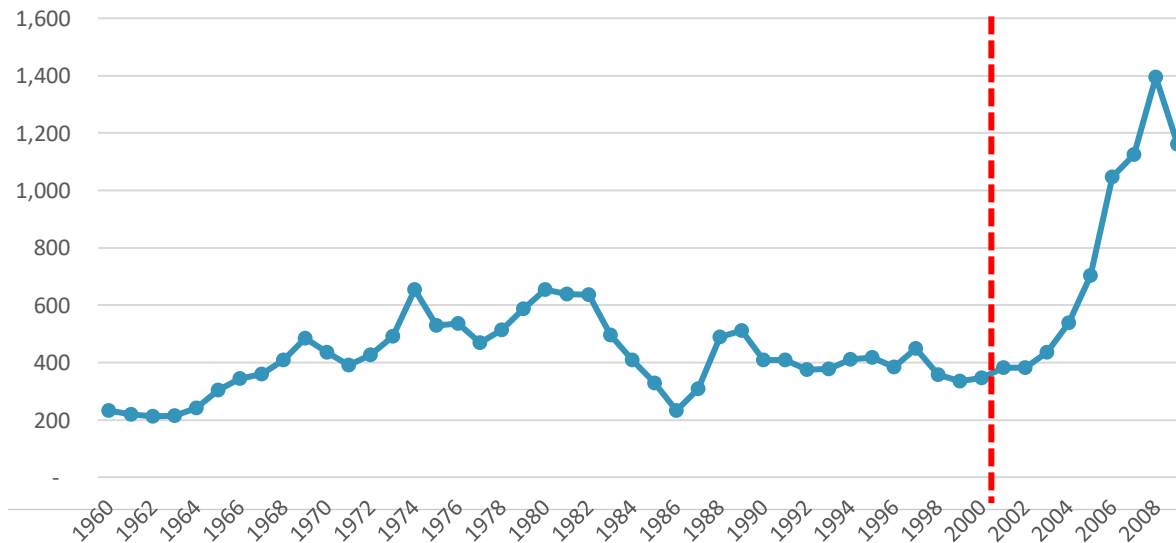


Case study: Japan

Between 1960-1990, Japan had high rate of growth. In 1960, its GDP per capita was 1/3 of the US, and grew at 9% per year. In 1990, its GDP per capita was 85% of the US but growth rate fell to 4% and growth did not resume.

Convergence Debate

- This is the case for most countries, however not for all cases
- The case of Zambia demonstrates how GDP growth is stagnant over time (up to 2000)
- Since 2000, policies to reform the economy led to improved economic growth



Case study: Zambia

In 1960 Zambia's GDP per capita was \$1,803 and in 2009 was \$1,765.

The economy did not grow because of the lack of foreign investments, government policy, lack of technological change and occurrence of natural disasters

Conclusion

- Countries undergo development experiences which vary from one country to another and depending on whether they are able to accumulate capital and increase productivity over time
- Among several explanations are macroeconomic and political stability, investments in health and education, governance and institutions, trade openness, and a favorable geography

Conclusion

- Economic models look at the relationships between output and capital, savings, and investment, along with other factors such as capital depreciation, and population growth
- Models, despite their usefulness, are based on assumptions and can only partially explain occurrences and as such, they are not necessarily accurate

THANK **Y**OU!