A Framework for Understanding Economic Growth
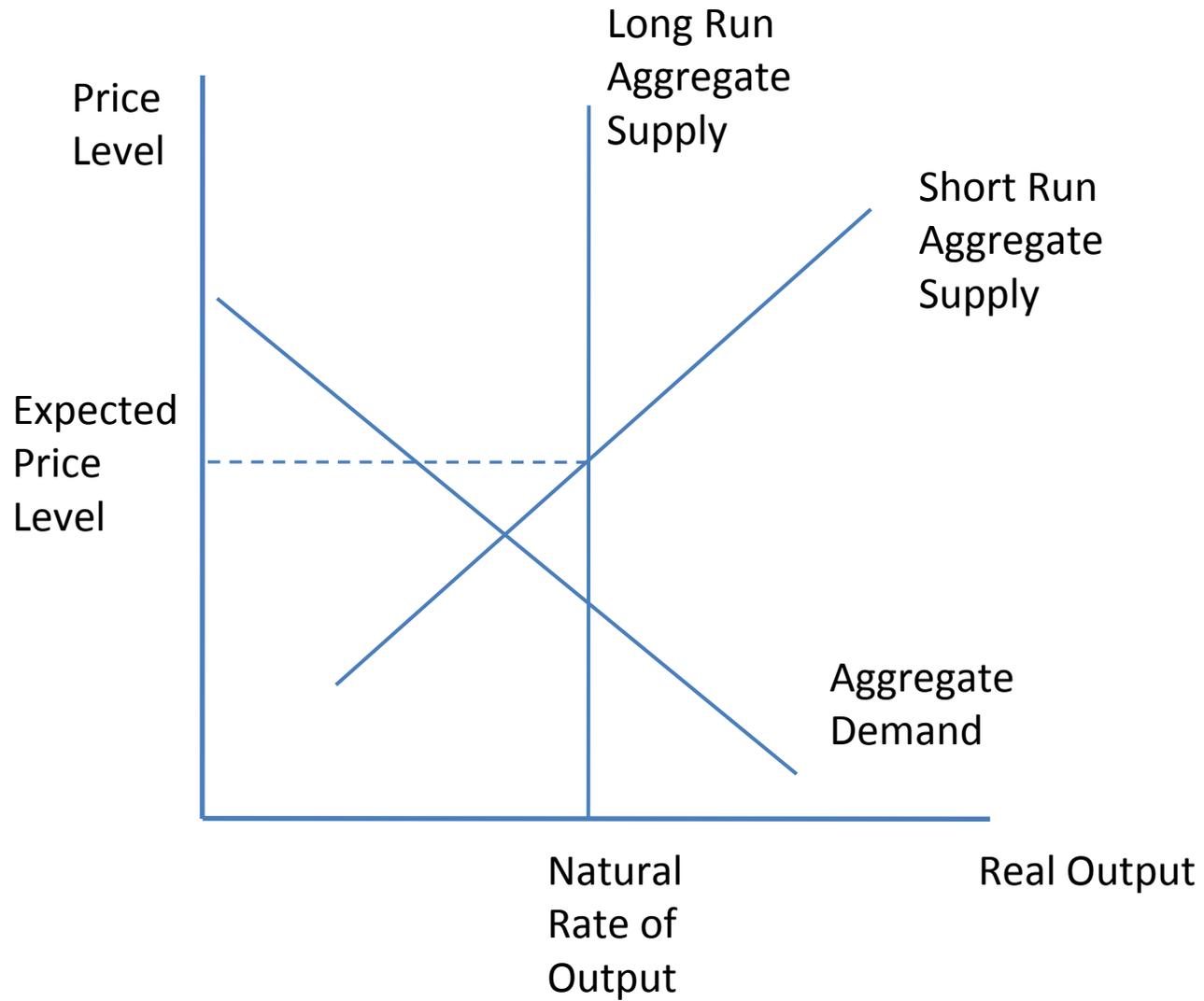
David N. Weil
Brown University and NBER
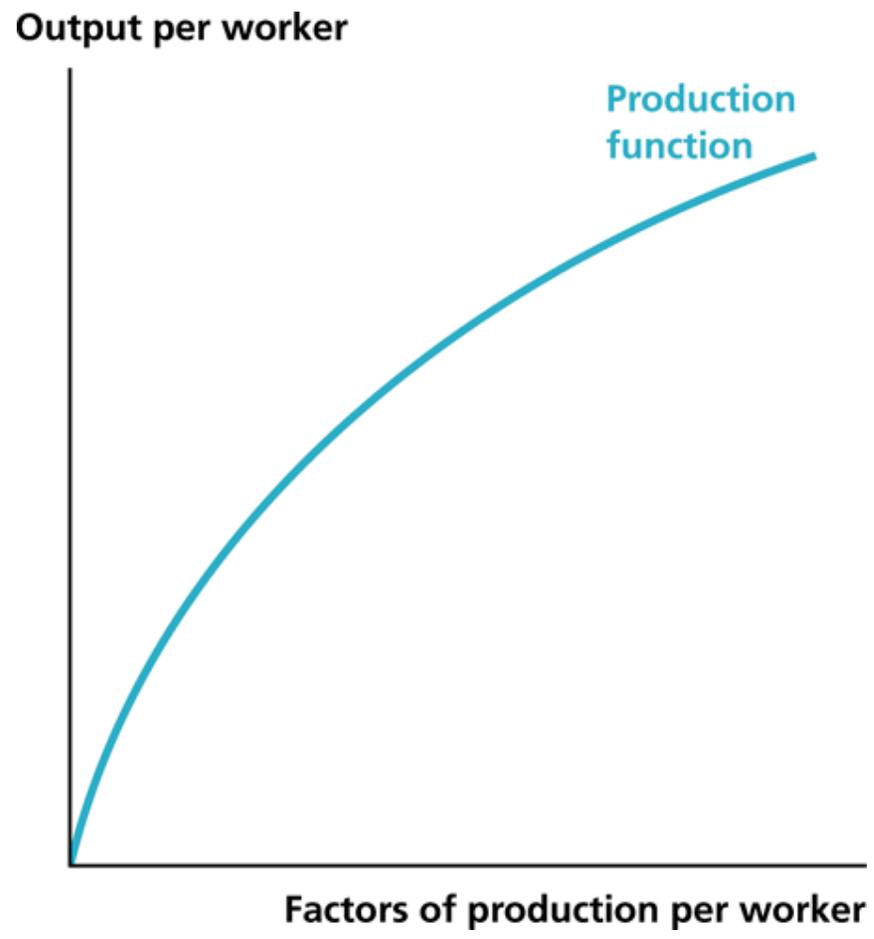
Short Run Macroeconomics
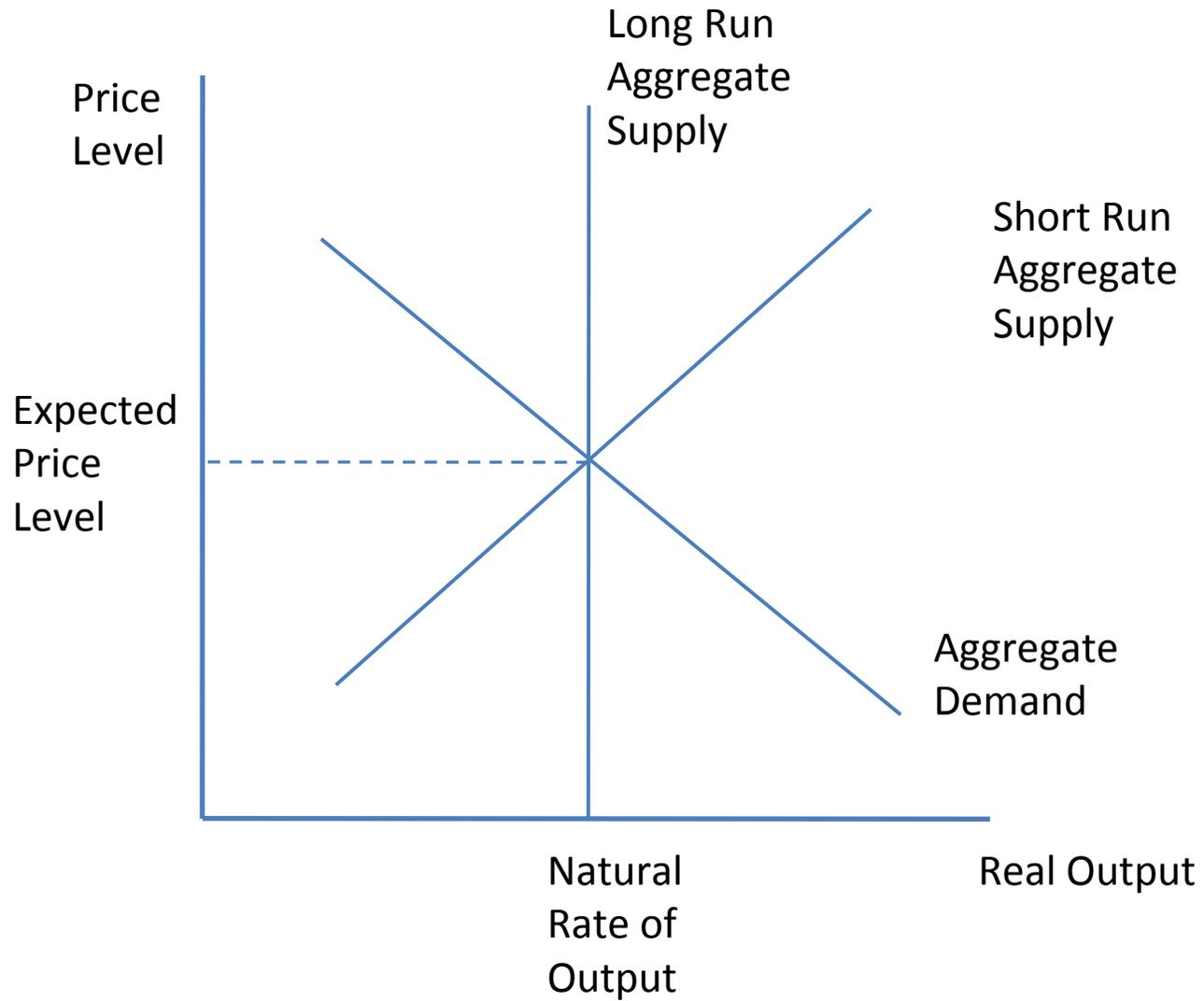
A Shortfall in Aggregate Demand

Output per worker

Production function

Factors of production per worker

(a) Differences in output due to factor accumulation

Output per worker

Production function in both countries

y_1

y_2

Country 2   Country 1

Factors of production per worker
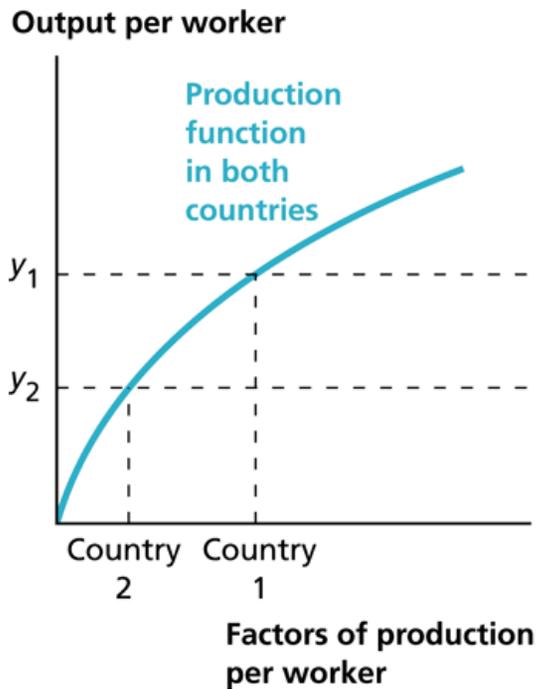
(b) Differences in output due to productivity

Output per worker

Production function in Country 1

Production function in Country 2

Both countries

Factors of production per worker
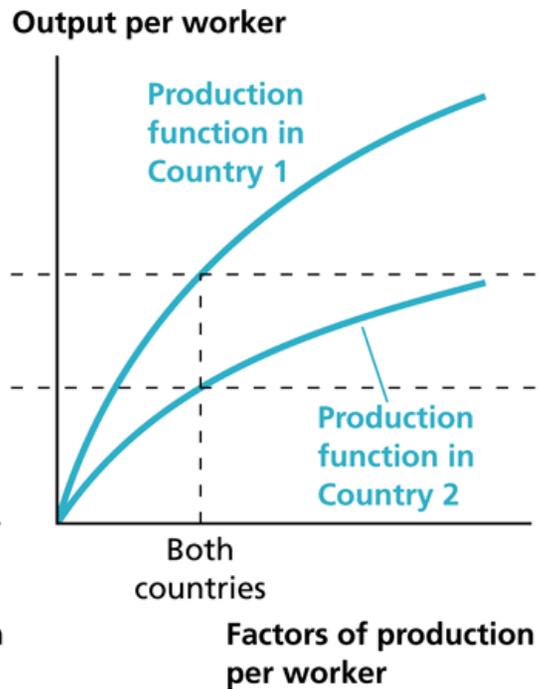
(c) Differences in output due to both productivity and factor accumulation

Output per worker

Production function in Country 1

Production function in Country 2

Country 2 Country 1

Factors of production per worker
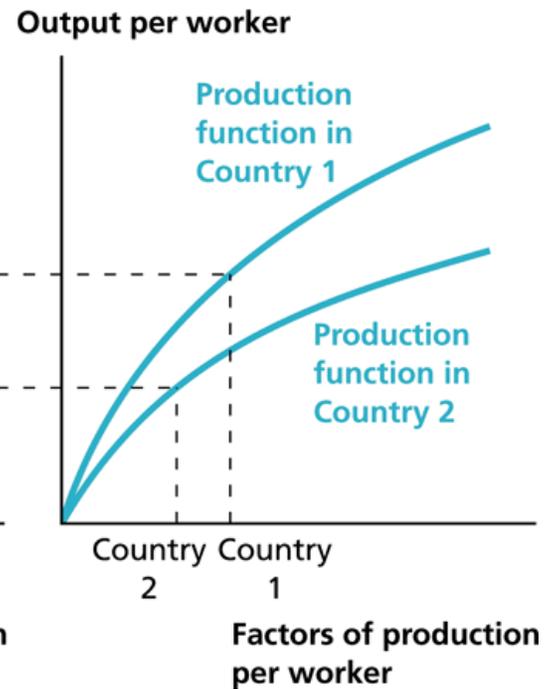
Capital per worker (2000 dollars)

1,000,000

100,000

Portugal

United States

Mexico

China

10,000

Zambia

India

1,000

1,000   10,000   100,000   1,000,000

GDP per worker (2000 dollars)
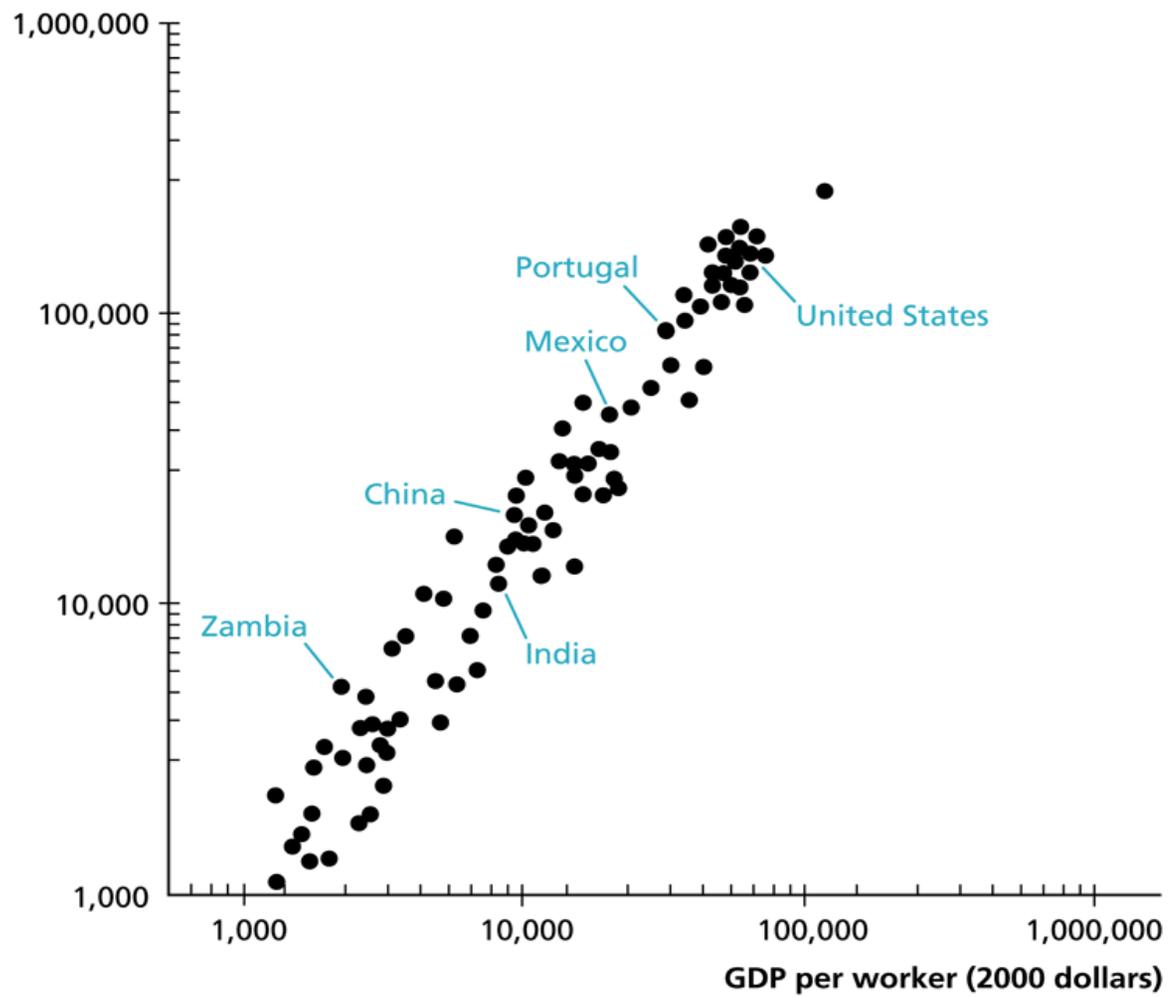
Average Years of Education

	1960	2000
Developing Countries	2.05	5.13
Advanced Countries	7.06	9.76

$$\text{Output per Worker}_i = \text{Factors of Production per Worker}_i \times \text{Productivity}_i$$

$$\frac{\text{Output per Worker}_i}{\text{Output per Worker}_j} = \left(\frac{\text{Factors of Production per Worker}_i}{\text{Factors of Production per Worker}_j} \right) \times \left(\frac{\text{Productivity}_i}{\text{Productivity}_j} \right)$$

Factors of production per worker relative to United States

Value	Income group
0.15	Poorest 20%
0.32	Second-poorest 20%
0.44	Middle 20%
0.64	Second-richest 20%
0.94	Richest 20%

For sources, see Table 7.2.

Productivity relative to United States

| Value	Income group
0.24	Poorest 20%
0.35	Second-poorest 20%
0.47	Middle 20%
0.73	Second-richest 20%
0.86	Richest 20%
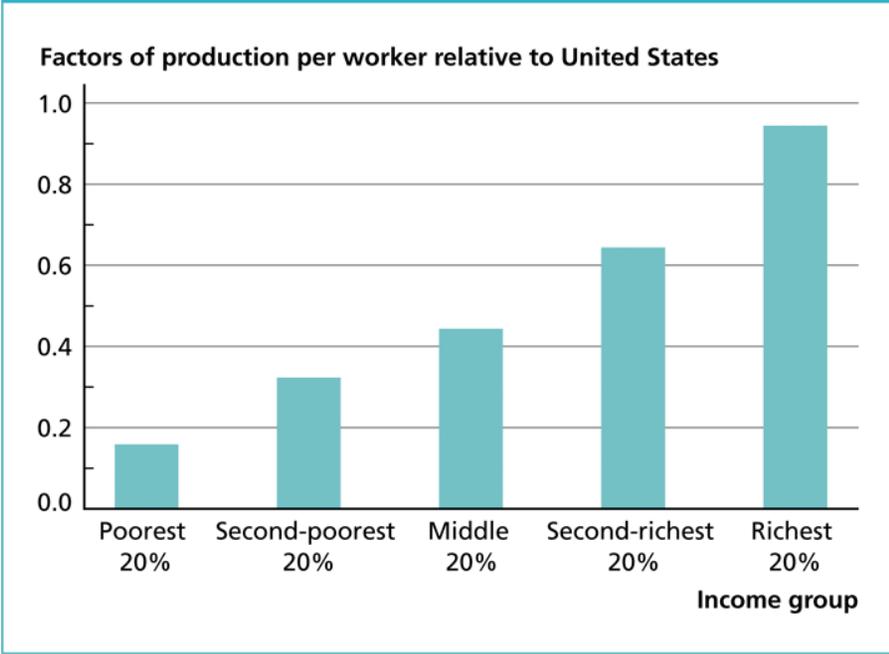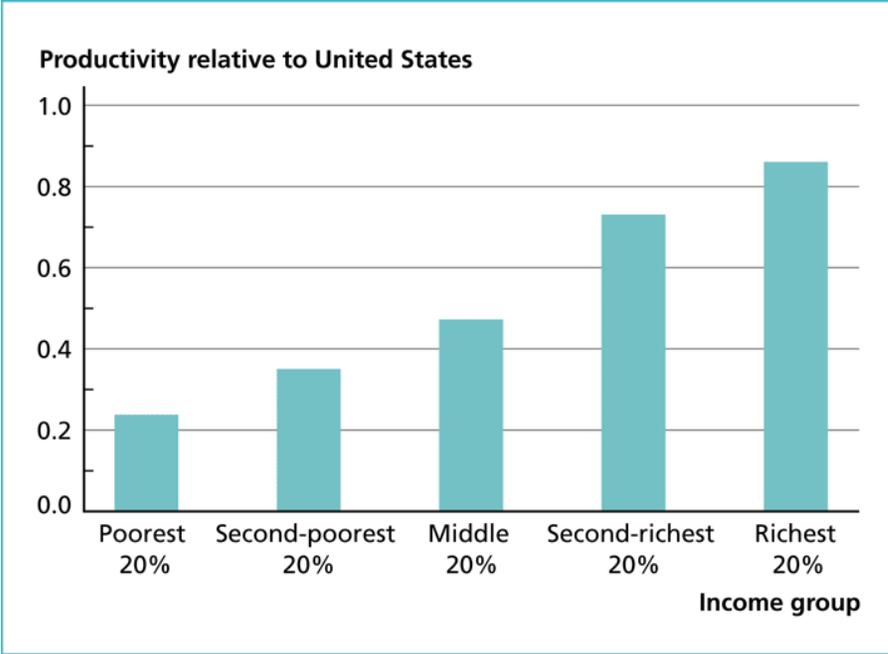
For sources, see Table 7.2.

Development Accounting for Mexico

Output per Worker   0.29

    Physical Capital per Worker   0.27
    Human Capital per Worker   0.79

Factors of Production per Worker   0.56

Productivity   0.52

Data for year 2000. All quantities relative to United States.

The Conceptual Framework

Factors of Production
per Worker

Output per Worker

Productivity

Technology
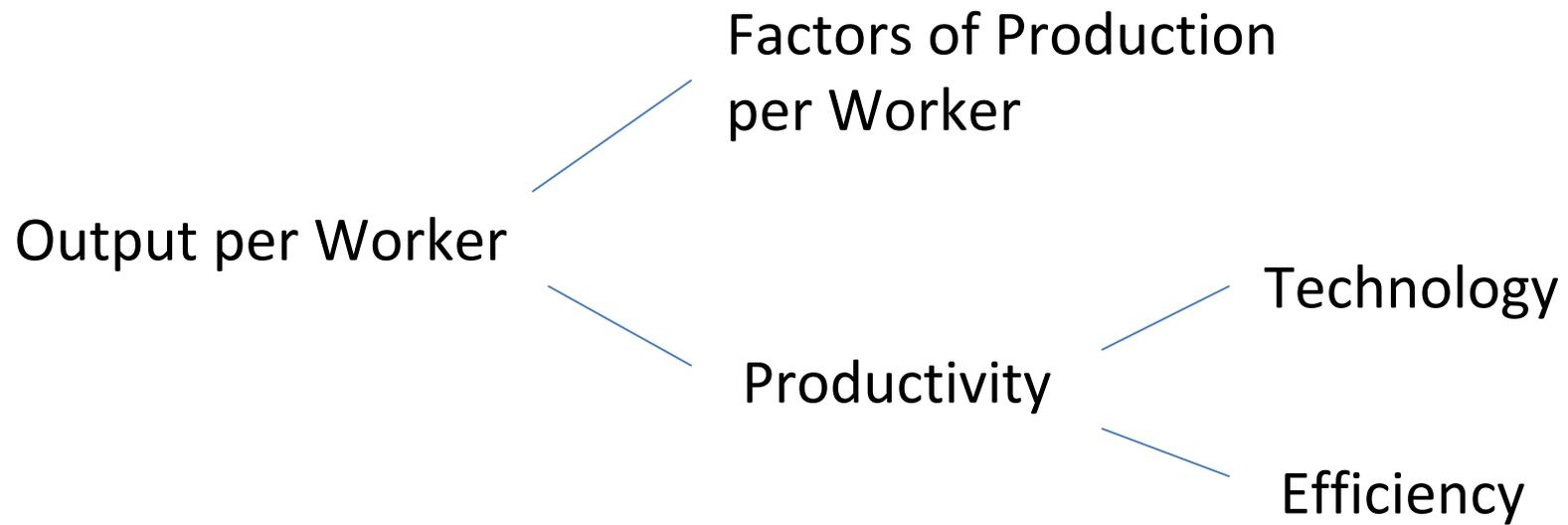
Efficiency

$$\text{Productivity}_i = \text{Technology}_i \times \text{Efficiency}_i$$

$$\frac{\text{Productivity}_i}{\text{Productivity}_j} = \left(\frac{\text{Technology}_i}{\text{Technology}_j} \right) \times \left(\frac{\text{Efficiency}_i}{\text{Efficiency}_j} \right)$$

Determinants of Efficiency (very partial list)

- Institutional Framework

- Trade Restrictions (legal or physical)

- Barriers to Mobility

- Monopolies

- Government Ownership of Firms

- Functioning of Financial System

20 Years of Growth Empirics on One Slide

SS Income = f(productivity, factor accumulation)
              (+)   (+)

Growth = f(SS Income, Current Income)
              (+)   (-)

Growth=f(Current Income, productivity, factor accumulation)
              (-)   (+)   (+)