Productivity

ECON 499: Growth and Development

Spring 2018

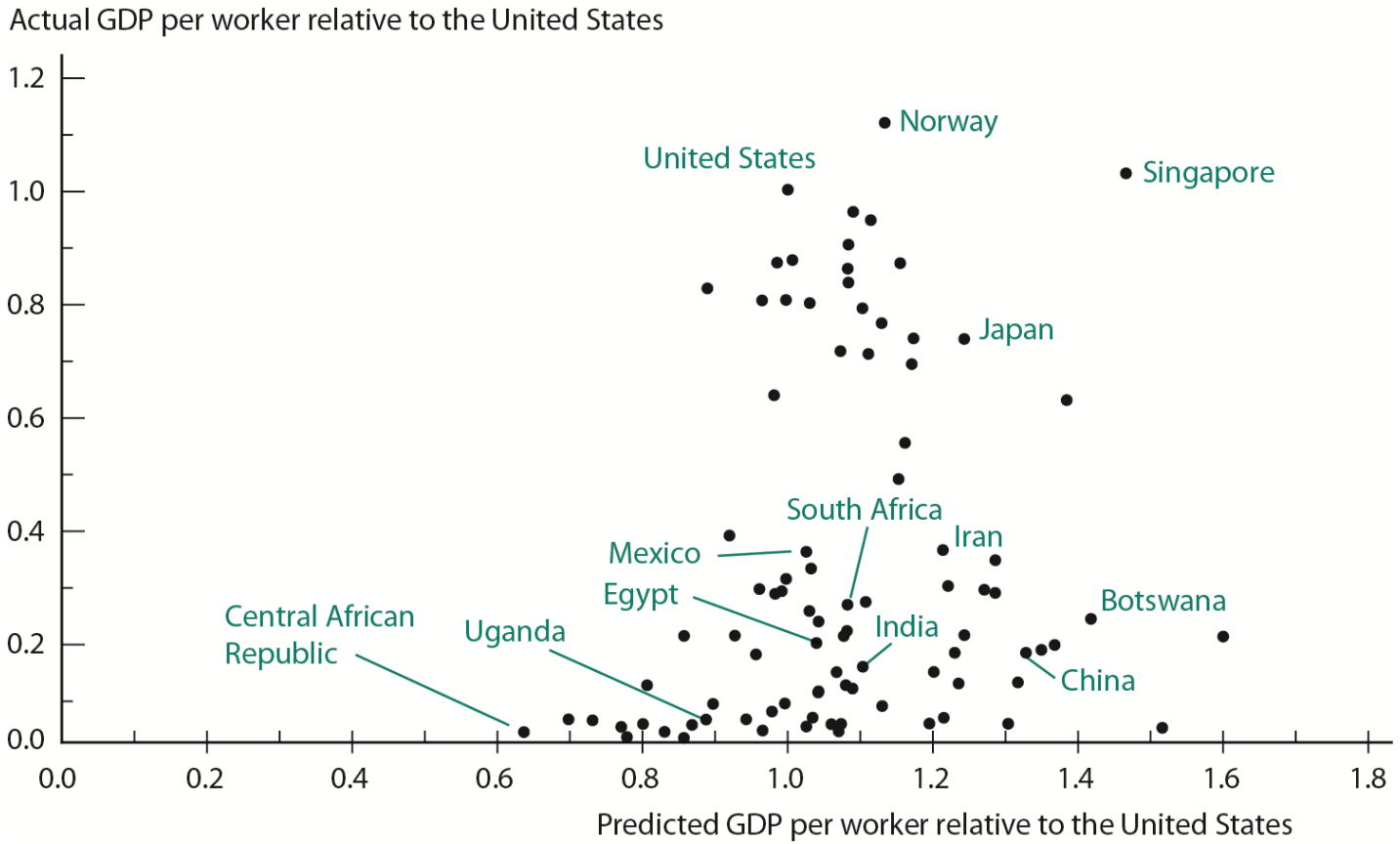
Announcements

- Reading
  - Chapter 7
- Homework due Friday
- Midterm next Thursday

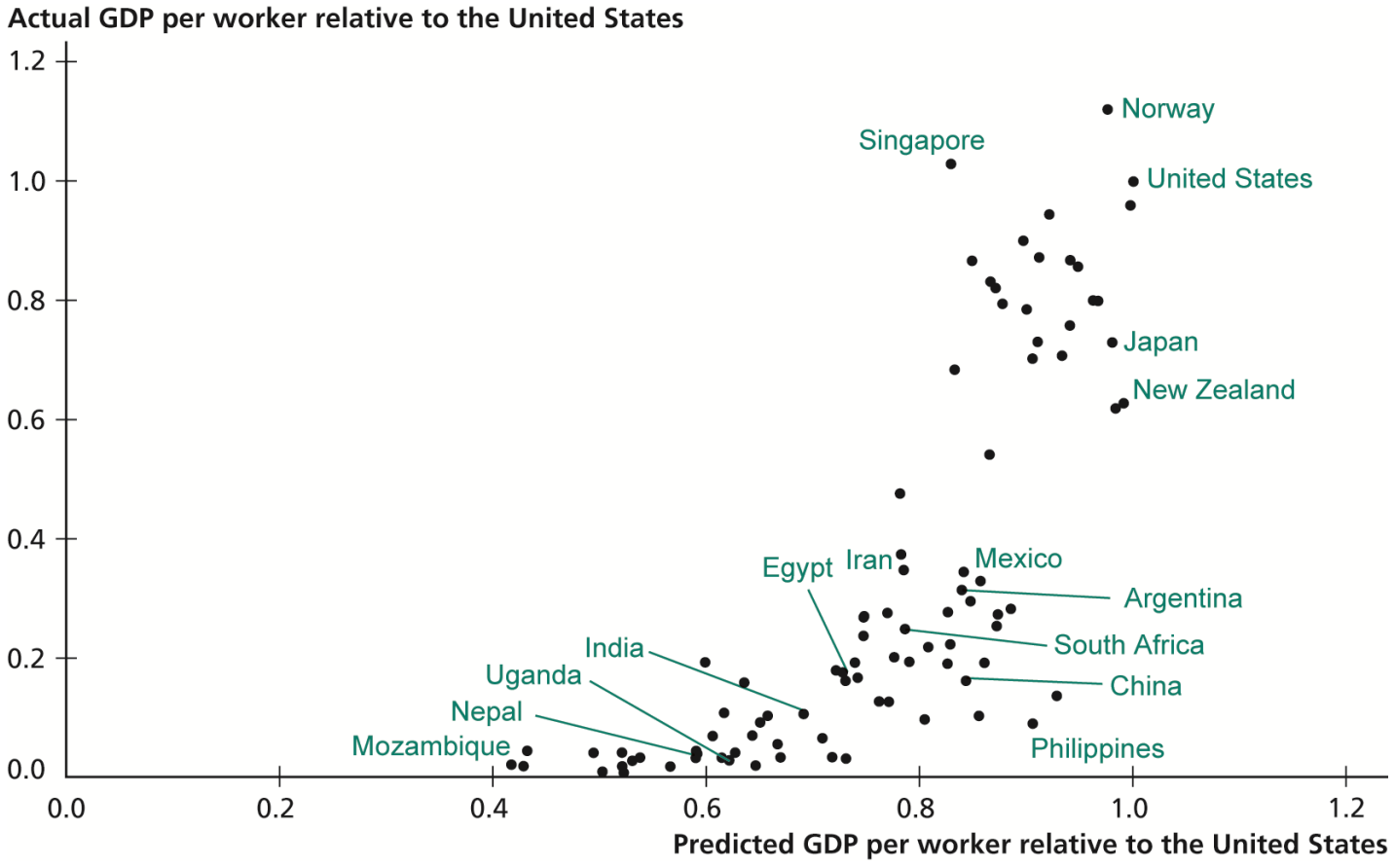
Explaining cross-country differences

- So far: $Y_t = K_t^{\alpha}(h_t L_t)^{1-\alpha}$
- We've tried to explain cross-country differences in terms of population growth, physical capital, human capital
- Large differences remain
- Factor accumulation alone not enough to explain differences in growth an income

Physical Capital Predicted vs Actual



Human Capital Predicted vs Actual

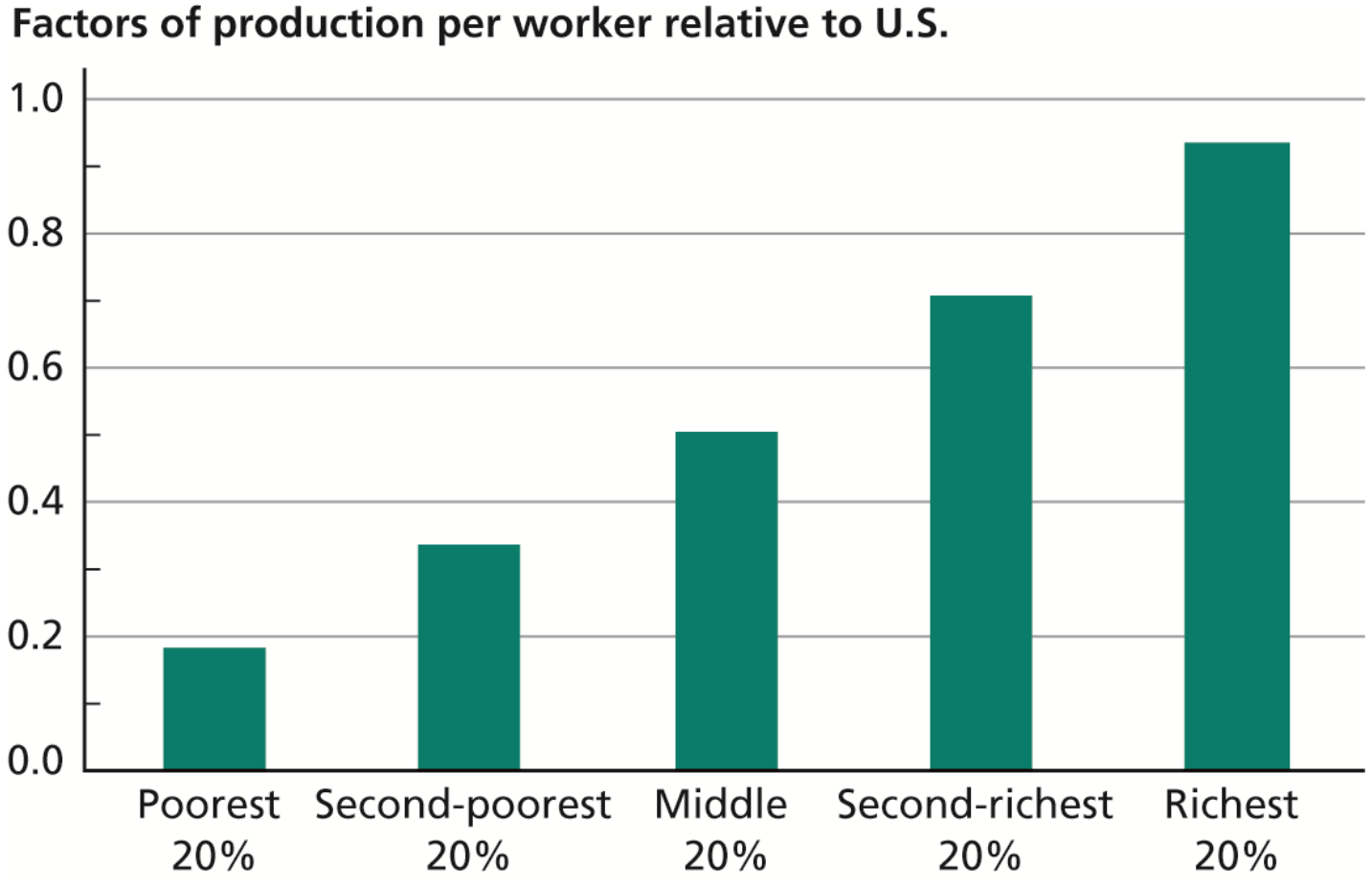


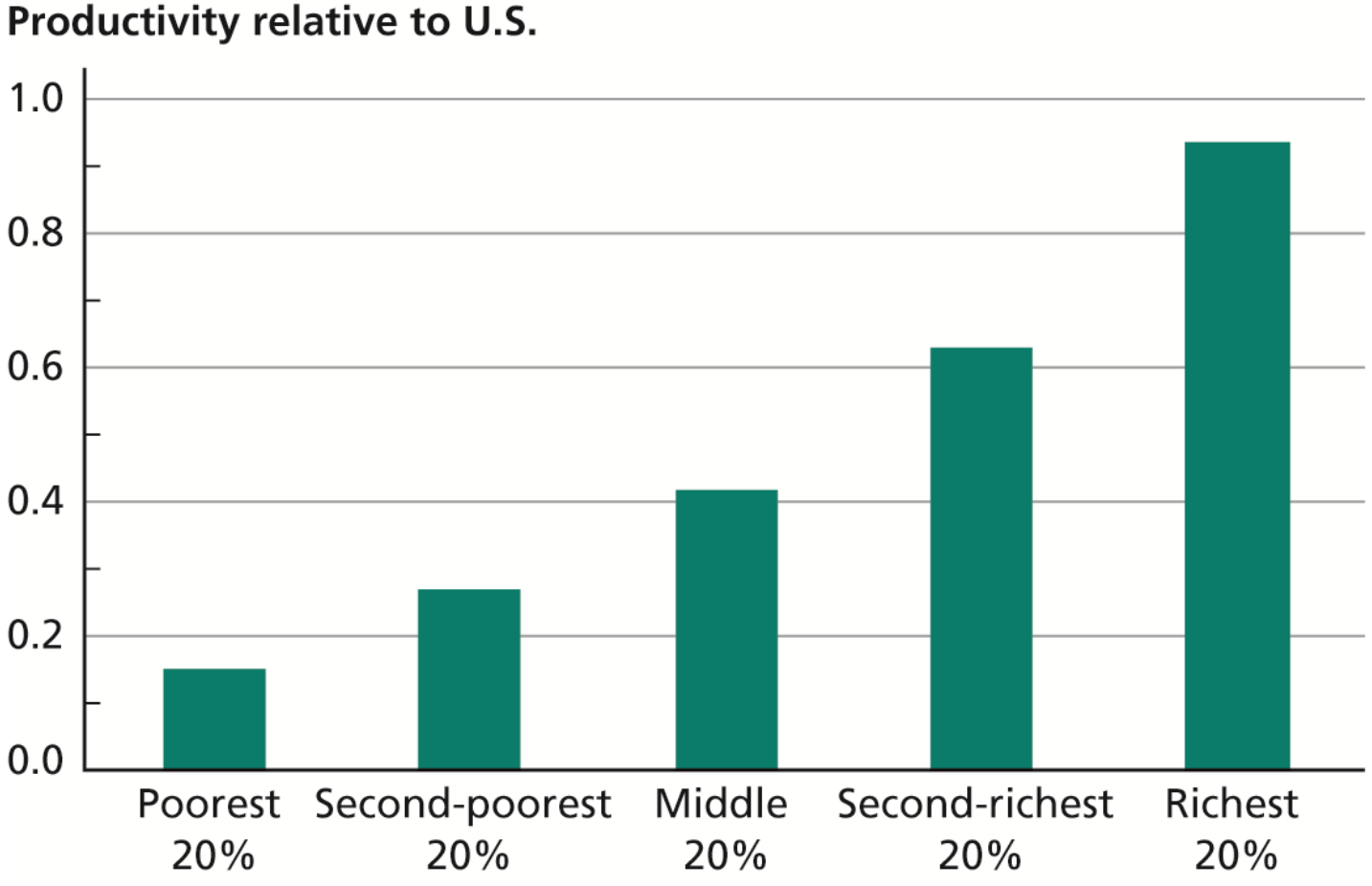
Productivity

- Some countries might be better at combining factors into output
- Technology, efficiency, work-ethic, etc
- How effective a country is at turning factors into output is called **productivity**
- Problem: Productivity is not directly observed, we must infer from other data using "accounting" techniques

Country	Output per Worker, y	Physical Capital per Worker, k	Human Capital per Worker, h	Factors of Production, $k^{1/3}h^{2/3}$	Productivity, A
United States	1.00	1.00	1.00	1.00	1.00
Norway	1.12	1.32	0.98	1.08	1.04
United Kingdom	0.82	0.68	0.87	0.80	1.03
Canada	0.80	0.81	0.96	0.91	0.88
Japan	0.73	1.16	0.98	1.04	0.70
South Korea	0.62	0.92	0.98	0.96	0.64
Turkey	0.37	0.28	0.78	0.55	0.68
Mexico	0.35	0.33	0.84	0.61	0.56
Brazil	0.20	0.19	0.78	0.48	0.42
India	0.10	0.089	0.66	0.34	0.31
Kenya	0.032	0.022	0.73	0.23	0.14
Malawi	0.018	0.029	0.57	0.21	0.087

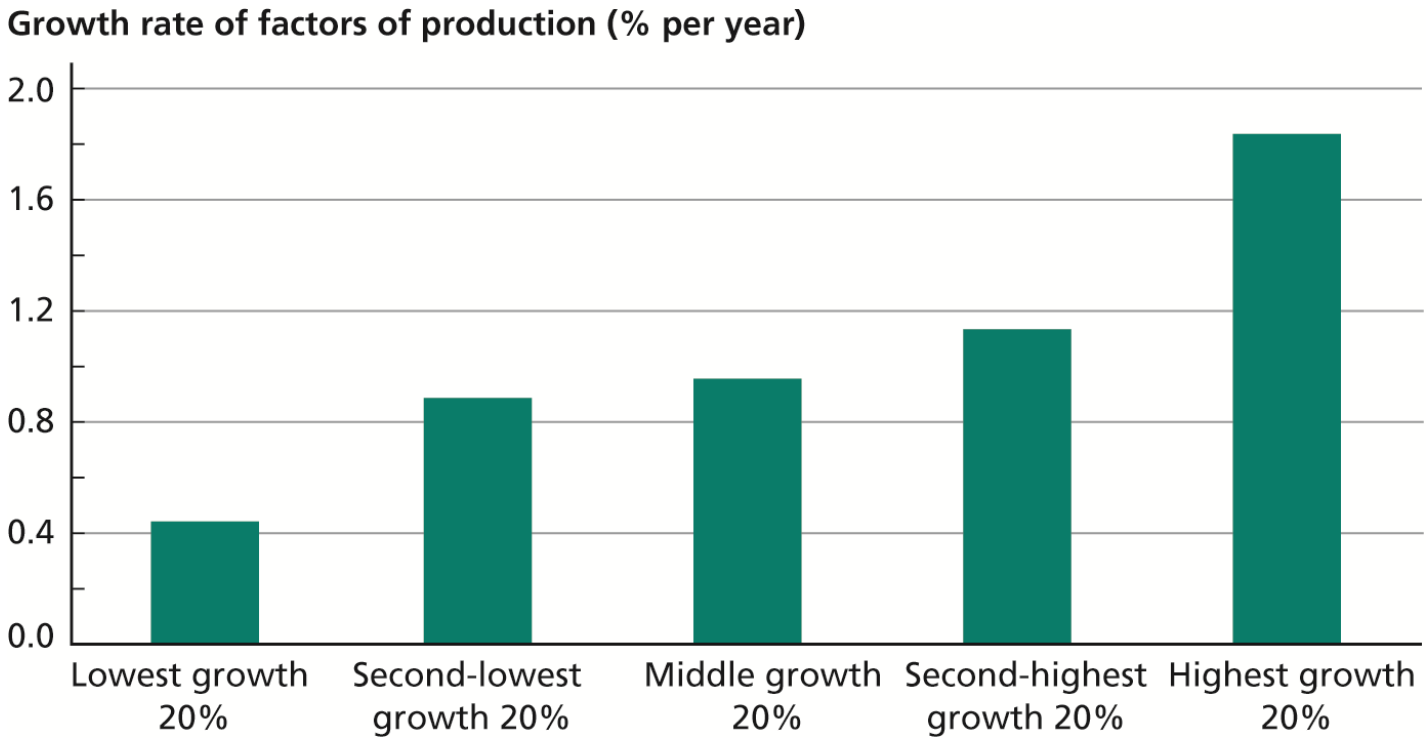
Sources: Output per worker: Heston, Summers, and Aten (2011); physical capital: author's calculations; human capital: Barro and Lee (2010). The data set used here and in Section 7.3 is composed of data for 90 countries for which consistent data are available for 1975 and 2009.

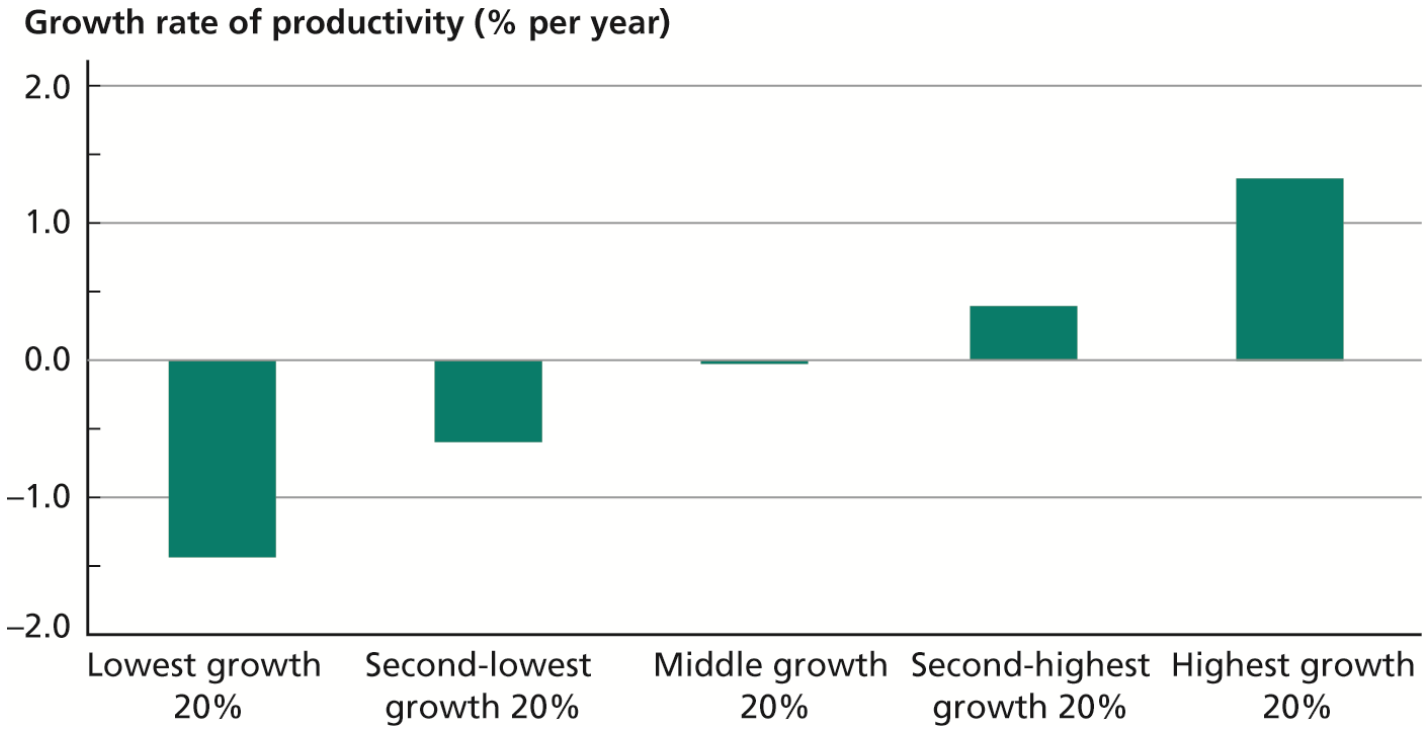

Factors of production per worker relative to U.S.
1.0
0.8
0.6
0.4
0.2
0.0
Poorest 20%
Second-poorest 20%
Middle 20%
Second-richest 20%
Richest 20%


Productivity relative to U.S.
1.0
0.8
0.6
0.4
0.2
0.0
Poorest 20%
Second-poorest 20%
Middle 20%
Second-richest 20%
Richest 20%

Productivity and income

- A large amount of the difference in income across countries is explained by productivity differences
- Rich countries are more productive than poor countries
- Productivity and factor accumulation are (roughly) equally responsible for cross-country income differences


Growth rate of factors of production (% per year)
2.0
1.6
1.2
0.8
0.4
0.0
Lowest growth 20%
Second-lowest growth 20%
Middle growth 20%
Second-highest growth 20%
Highest growth 20%


Growth rate of productivity (% per year)
2.0
1.0
0.0
–1.0
–2.0
Lowest growth 20%
Second-lowest growth 20%
Middle growth 20%
Second-highest growth 20%
Highest growth 20%

Productivity and growth

- Factor growth and productivity growth contribute to income per capita growth
- Productivity growth relatively more important at explaining differences in income growth
- Countries with lowest growth have negative productivity growth, despite positive factor growth
- Low-growth countries are getting **worse** at transforming factors into output over time