Innovation, Economic Growth, and the Way Forward

A Review of Readings

Ashwin Iyenggar

Corporate Strategy and Policy
Indian Institute of Management Bangalore

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Outline

Economic Growth and Innovation

Readings this week

- Durlauf et al. (2005) - Econometric tools used in studying economic growth
- Abramovitz (1993) - Challenges in understanding the sources of economic growth
- Young (1994) - Total Factor Productivity in East Asian Economies

Growth Econometrics

Stylized Facts

- GDP per woker, Table 1, page 564
- Growth miracles and disasters, Table 2-3, page 566-567
- Does past growth predict future growth?, Table 4
- Differences by region, Table 5, Page 572

Growth Econometrics

Stylized Facts

- Most countries have grown richer, but income disparities remain
- Past growth is a weak predictor of future growth, it is slowly
- Growth slowdown is observed throughout most of the income distribution.
- Convergence hypothesis: efects of initial conditions eventually disappear.

Growth Econometrics

Statistical Tools

- Beta convergence: Choice of variables, Identification and non-linearity, Endogeneity, Measurement error, Effects of linear approximation
- Distributional approaches: sigma-convergence, ...

Growth Econometrics

Statistical Issues

- Outliers
- Measurement Error
- Missing Data
- Heteroskedasticity
- Cross-seciton error correlation

Growth Econometrics

Limitations

- Model Uncertainty - identification of empirically salient determinants of growth when the range of potential factors is large relative to the number of observations
- Standard inference procedures based on a single model can grossly overstate the precision of inferences about a given phenomenon
- Cross country data

The Search for the Sources of Growth

Summary

- Standard growth accounts of economic historians is misleading
- Abramovitz (1955): per capita input of labor and capital accounted for 10% growth of net output per capita. Residual = Technological Progress?

The Search for the Sources of Growth

Issues with the Residual

- Measure of factor inputs was incomplete
- Intangibles - education, on-the-job training, R&D were neglected
- Other missing categories of business spend
- Denison showed a) neglected elements, b) effect of residual sharply lower

The Search for the Sources of Growth

Discussion

- Standard growth accounting - sources of growth operate independently of one another
- Schumpeter - net capital accumulation would fall to zero in the absence of innovation
- Nelson 1964 - embodiment question - by reducing the age of capital stock
- David and Abramovitz - capital using technological progress increases demand for capital relative to labor
- Arrow - learning by doing
- Rosenberg - learning by using

The Search for the Sources of Growth

Discussion

- Comparison of 19th and 20th century character of economic growth
- Growth of capital intensity was larger source of labor productivity growth in 19th century than in the 20th
- Rates of total factor productivity was low
- Dilemma: If labor quality, urban migration and scale contributed to growth, there is little room for technological progress. If you assume technological progress, there is no room for education, better resource allocation
- 19th century - physical capital heavy, which weakened in the 20th century
- distinguish raw labor from labor augmented by education and investment in knowledge

The Search for the Sources of Growth

Discussion

- Tangible Capital vs Intangible Capital
- Esteemed economists held: economies of scale = technological progress
- Urbanization, Immigration added scale to economy
- Long period estimates - advantages and disadvantages

The Search for the Sources of Growth

Discussion

- Technology dependent rubric of capital accumulation
- Shift toward intangible capital
- Rise in educational level, investment in R&D
- School levels rose due to human capital using bias in the composition of output
- Shift from blue collar to white collar work

The Search for the Sources of Growth

Summary

- Interdependence of proximate sources of economic growth
- Interdependence runs both ways - largely ignored

The Tyranny of Numbers

Summary

- How does factor accumulation explain post war growth in east Asia
- Output growth and Manufacturing growth is unprecedented
- Total factor productivity growth is similar to OECD nations

The Tyranny of Numbers

Countries

- Hong Kong
- Singapore
- South Korea
- Taiwan

The Tyranny of Numbers

Summary

- Premise that productivity growth in Asian countries has been extraordinarily high is incorrect
- Increases in output brought through rise in participation rates, investment to GDP ratios, educational standards and transfer of labor from agriculture to other sectors
- South Korea
- Taiwan

Abramovitz, M. (1993). The search for the sources of growth: areas of ignorance, old and new. *The Journal of Economic History*, 53(02):217–243.

Durlauf, S. N., Johnson, P. A., and Temple, J. R. (2005). Chapter 8 growth econometrics. In Aghion, P. and Durlauf, S. N., editors, *Handbook of Economic Growth Vol 1A*, volume 1, Part A of *Handbook of Economic Growth*, pages 555 – 677. Elsevier.

Young, A. (1994). The tyranny of numbers: Confronting the statistical realities of the east asian growth experience. Working Paper 4680, National Bureau of Economic Research.