

Endogenous Growth Theory

Lecture Notes for the winter term 2010/2011

Ingrid Ott — Tim Deeken | October 19th, 2010

CHAIR IN ECONOMIC POLICY



Some organizational details



- Lecture: weekly
- Exercise: fortnightly, starting October 28, 2010
- studienbegleitende Leistungen
- sit-in exam: March 23-25, 2011
- slides: wipo.iww.kit.edu \rightarrow Lehre
- Semesterapparat

Literature



- Acemoglu, Daron (2009), Introduction to Modern Economic Growth, Princeton University Press.
- Aghion, Philippe and Howitt, Peter (2009), The Economics of Growth, MIT Press.
- Barro, Robert J. and Sala-i-Martin, Xavier (2004). Economic Growth, Second Edition, MIT Press, Cam-bridge and London.
- Sydsæter, K. and Hammond, P. (2008). Essential Mathematics for Economic Analysis, Third Edition, Pearson Education Limited, Essex.
- Sydsæter, K., Hammond, P., Seierstad, A. and Strom, A. (2008). Further Mathematics for Economic Analysis, Second Edition, Pearson Education Limited, Essex.

Contents

Contents (preliminary) I



Introduction

- Growth and Development: The Questions
- The Solow Growth Model
- The Solow Model and the Data
- Fundamental Determinants of Differences in Economic Performance
- 2 Toward Neoclassical Growth
- Neoclassical Growth
- Indogenous Technological Change
- Technology Diffusion, Trade, and Interdependence



 There are very large differences in income per capita and output per worker across countries today.

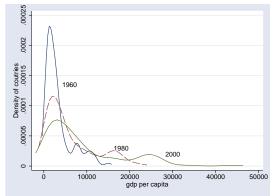


Figure 1.1: Distribution of PPP-adjusted GDP per capita.



- Part of the spreading out of the distribution in the Figure is because of the increase in average incomes.
- More natural to look at the log of income per capita when growth is approximately proportional:
 - when x(t) grows at a proportional rate, $\log x(t)$ grows linearly,
 - if $x_1(t)$ and $x_2(t)$ both grow by 10, $x_1(t) x_2(t)$ will also grow, while log $x_1(t) \log x_2(t)$ will remain constant.
- The next Figure shows a similar pattern, but now the spreading-out is more limited.



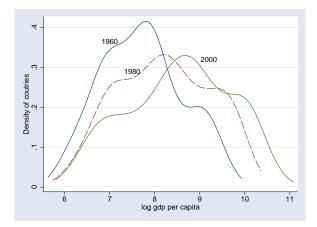


Figure 1.2: Estimates of the distribution of countries according to log GDP per capita (PPP-adjusted) in 1960, 1980 and 2000.



- Theory is easier to map to data when we look at output (GDP) per worker.
- Moreover, key sources of difference in economic performance across countries are national policies and institutions.
- The next Figure looks at the unweighted distribution of countries according to (PPP-adjusted) GDP per worker
 - "workers": total economically active population according to the definition of the International Labour Organization.
- Overall, two important facts:
 - Large amount of inequality in income per capita and income per worker across countries.
 - Slight but noticeable increase in inequality across nations (though not necessarily across individuals in the entire world).





Figure 1.3: Distribution of log GDP per worker (PPP-adjusted).

Should we care about cross-country income differences?



- income levels reflect standards of living; despite pollution and other negative implications of growth, richer countries display higher quality of life, standards of living, and health
- strong positive correlation between income/capita and GDP/c
- strong positive correlation between life expectancy and GDP/c

Economic Growth and Income Differences: What we want to understand



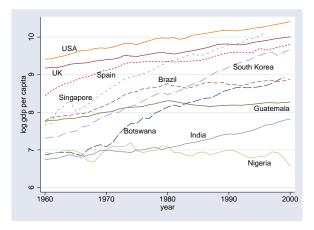


Figure 1.4: The evolution of income per capita 1960-2000.

Economic Growth and Income Differences I



- Why is the United States richer in 1960 than other nations and able to grow at a steady pace thereafter?
- How did Singapore, South Korea and Botswana manage to grow at a relatively rapid pace for 40 years?
- Why did Spain grow relatively rapidly for about 20 years, but then slow down? Why did Brazil and Guatemala stagnate during the 1980s?
- What is responsible for the disastrous growth performance of Nigeria?
 - Central questions for understanding how the capitalist system works and the origins of economic growth.
 - Central questions also for policy and welfare, since differences in income related to living standards, consumption and health.

Economic Growth and Income Differences II



 Our first task is to develop a coherent framework to investigate these questions and as a byproduct we will introduce the workhorse models of dynamic economic analysis and macroeconomics.



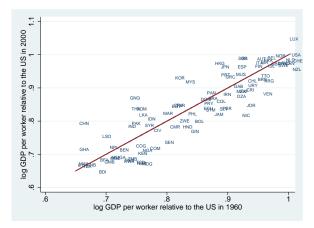


Figure 1.5: Log GDP per worker in 2000 and 1960.



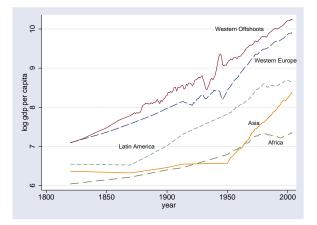


Figure 1.6: Evolution of GDP per capita 1820-2000.

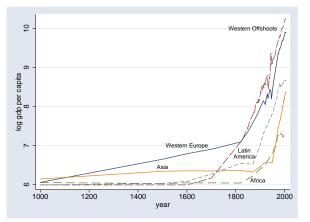


Figure 1.7: Evolution of GDP 1000-2000.

Why occurred the take-off occur about 200 years and? Why took it place Growth and Development: The Questions

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October 19th, 2010 17/23



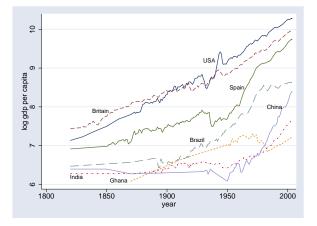


Figure 1.8: Evolution of income per capita in various countries.

Correlates of Economic Growth



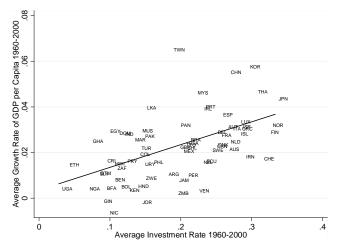


Figure 1.9: Average investment to GDP ratio and economic growth.

Growth and Development: The Questions

Correlates of Economic Growth



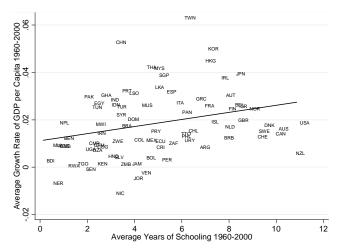


Figure 1.10: Schooling and economic growth.

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From Correlates to Fundamental Causes



- Correlates of economic growth, such as physical capital, human capital and technology, will be our first topic of study.
- But these are only proximate causes of economic growth and economic success:
 - why do certain societies fail to improve their technologies, invest more in physical capital, and accumulate more human capital?
- Return to Figure 1.4 above to illustrate this point further:
 - How did South Korea and Singapore manage to grow, while Nigeria failed to take advantage of the growth opportunities?
 - If physical capital accumulation is so important, why did Nigeria not invest more in physical capital?
 - If education is so important, why are education levels in Nigeria still so low and why is existing human capital not being used more effectively?
- The answer to these questions is related to the *fundamental causes* of economic growth.

From Correlates to Fundamental Causes



- We can think of the following list of potential fundamental causes:
 - Iuck (or multiple equilibria)
 - 2 geographic differences
 - institutional differences
 - Generation Content of the second s
- An important caveat should be noted: discussions of geography, institutions and culture can sometimes be carried out without explicit reference to growth models or even to growth empirics.
- But it is only by formulating parsimonious models of economic growth and confronting them with data that we can gain a better understanding of both the proximate and the fundamental causes of economic growth.



- Why are there such large differences in income per capita and worker productivity across countries?
- Why do some countries grow rapidly while other countries stagnate?
- What sustains economic growth over long periods of time, and why did sustained growth start 200 years ago or so?