

DV490 Lecture 1: Economic growth: basic concepts, ideas and theories

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Outline:

- I. How important is aggregate growth?
- II. What is growth? Problems with measuring growth.
- III. Malthus to present: economic growth in historical context

I. Inequality and Growth: How important is aggregate growth anyway?

Do the poor benefit from global growth? A number of economists have made the claim that aggregate growth does help the poor. Other social scientists, however, argue that the poor are mostly left out of growth, or even that growth could make them worse off (see, for example, the 2007 survey article by Emma Aisbet). In the middle, some concede that the poor may benefit in absolute terms, but that they benefit disproportionately less than the average household so that inequality within-countries is on the rise. Which of these claims are true? Certainly we can think of examples where each of these possibilities seem to have occurred ... for example, many of us know of certain people who have not benefited from growth and may have been made worse off by globalisation, so even the most pessimistic of the arguments may sound plausible. But what does the data say? Which of these claims is better informed by careful analysis and backed up by solid empirical evidence?

While it would seem obvious that these claims should be tested empirically, in fact it has only been in the last 20 years or so that good quality macro-economic data on income distribution across a broad sample of countries over several decades has become available (the most common data set of this sort was assembled by Deninger and Squire and can be downloaded from the World Bank web site, but there are several others now as well). A number of studies came out in early 2000s that analyzed this data to consider the contribution of aggregate economic growth to the alleviation of global poverty. Others have combined macro and micro-level household survey data to do the same thing.

One approach taken by a number of authors is to consider the overall global distribution of income across all people of the world, and the impact that national-level aggregate economic growth has had on this distribution. A number of papers ask the simple question: has global level of income inequality gotten better or worse? One might think that if global income inequality is rising along with overall average income (i.e. from global economic growth), then that growth must be associated with increasing poverty. However it is not that clear...

In particular, the question of what is happening to the evolution of global income inequality can be further decomposed into some further questions:

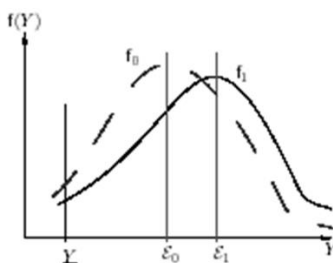
- What is driving global movements in income inequality: changes in the distribution of income *between* countries, or changes in the distributions of income *within* countries?
- Does the growth process itself have any contributing role influencing the evolution of within-country inequality? Is there *causality*?

Decomposition of Global Inequality

In terms of the first question, there is very strong empirical evidence from many authors that (with a few well known exceptions) within-country income inequality is *relatively* stable over time. This is not to say that it is totally static – for example within-country income inequality has been increasing in many countries recently – but that (especially compared to growth) income inequality (usually) doesn't display large swings from one year to the next. As a result, when you look at evolution of global income distribution, most of the change in the global income distribution of individuals seems to be coming from changes in the relative distribution of income across countries.

As Danny Quah here at the LSE concludes (from his 2002 analysis on the “simple arithmetic” of growth and inequality):

“These results emphasize that for determining world inequalities, the forces assuming first-order importance are those macroeconomic ones that determine cross-country patterns of growth and convergence. Inequality across individuals worldwide remains a critical issue of increasing concern. However, the relation between a country's growth performance and its within-country inequality has only a small role to play in determining global inequality dynamics.”



Because China and India are so populous, when we look at the global distribution at the individual level then whatever happens in these two countries taken on enormous importance. Both of these countries have grown dramatically over the past decades, and although income inequality within each country (especially China) has increased, this increase has not been dramatic enough to cancel out the dramatic forward shift of the entire distribution, ensuring that more and more people have their incomes lifted and are brought out of poverty.

Depending on the methodology chosen, researchers have come to slightly different conclusions about world income inequality. Danny Quah has found a slight increase in global inequality – but this is almost entirely driven by the fact that between China and India, the one that was initially richer, China, has grown faster and thus increased inequality between them. This has important implications for poverty reduction as well as inequality. Between India and China together, Quah calculates that their growth over

this period resulted in over 625 million people being brought above the threshold level of \$2/day income.

Using a different methodological approaches, Xavier Sala-i-Martin of Columbia University has a series of papers (2001, 2002, 2006, 2009) in which he finds not only that global inequality has *decreased* (also due primarily to fast growth in China and India), but that both poverty rates and absolute head counts of people in absolute poverty have declined significantly (on the order of half a billion people being brought out of abject poverty). Among the striking conclusions of Sala-i-Martin et al. (2009):

- Global poverty counts decline between 1970 and 2006 for poverty lines from \$1/day to \$3/day. The total number of poor people has declined by more than 617 million if we use the \$1/day line and by more than 780 million if we use the \$2/day line.
- For higher poverty lines, poverty counts increased during the early years but are all declining by 2006.
- Global income inequality has fallen between 1970 and 2006.
- Most of the decline in inequality is a decline in population-weighted between-country inequality.

Danny Quah's "simple arithmetic" relies on the observation that aggregate growth tends to move the whole distribution forward simultaneously (for aggregate growth to increase poverty it would need to be the case that the left hand tail of the distribution would stretch out further to the left even as the mean of the distribution moved rightwards). Empirical evidence from these country aggregate-level datasets from the last 20 years found that this is indeed approximately correct.

An early much publicized (and critiqued) paper by Dollar and Kraay (2001) examined the relationship between overall GDP and aggregate growth rates and the incomes (and growth of income) of the poorest 20% of the distribution for 80 countries covering a period of 4 decades. They found that,

- The incomes of the poor increased, approximately one for one, with the overall growth in mean income during periods of significant growth
- The incomes of the poor do not fall disproportionately during periods of "crisis" or negative overall growth.
- Aggregate GDP growth is not associated with increases in income inequality within countries.

In a follow up study a few years later ("*Growth is Still Good for the Poor*"), Dollar *et al.* (2016) find again a more or less 1-to-1 relationship between aggregate growth and growth of the lower end of the distribution, and find relatively little evidence that particular policies make growth more or less "pro-poor".

It is important to keep in mind that the Dollar & Co. results reflect the **average** relationship between growth and poverty across their sample of countries (121 countries in total) over the sample period (40 years) – it is certainly still possible that in some circumstances growth is either pro- or anti-poor. We will see plenty of analyses over this year where particular policies will potentially have an effect on both poverty and on growth, and it is certainly not always the case that these move together.

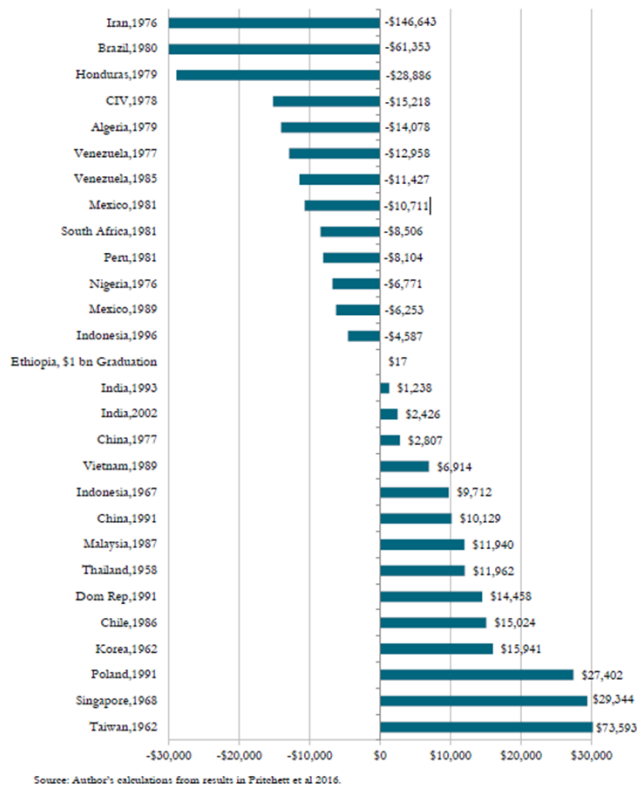
Another way to think about this is: what achieves greater poverty reduction, aggregate economic growth or redistribution/targeted anti-poverty programmes?

Mathematically, absolute poverty reductions in a country can be decomposed into growth in mean incomes, a reduction in inequality of incomes, or a combination of the two. Research over the past two decades (see, for example, Alvaredo and Gasparini 2015) has indeed found that over the past few decades, growth in mean incomes has been the primary driver of reductions in poverty.

Lant Pritchett (2018) provides some more concrete quantitative estimates to Danny Quah's arithmetic argument/intuition. Specifically, he compares the poverty reduction achieved from economic expansions (and the losses from aggregate contractions) with the best returns so far achieved from targeted anti-poverty programs. In particular, RCT evidence (see the Banerjee et al. 2015 article in *Science*) suggests that intensive complex programmes for the poor, when delivered well, cost US\$4,545 over two years to deliver US\$344 in income gains in year 3, which at 5% discount rate implies a lifetime gain (over 50 years) of \$3,927. To put this in perspective, it would take \$6,370 invested at a real return of 5.4% (the U.S. stock market average) to provide an annual payout to a household in a poor country of \$344. So, the best-practice targeted anti-poverty programme outperforms cash, but not by that much.

If we assume these benefits of the best-practice anti-poverty are sustained forever, Pritchett calculates that if \$1 billion were spent implementing the programme in Ethiopia this would increase per capita income by \$17. On the other hand, the gains from an aggregate growth acceleration in 1992 followed by another in 2002 are \$255 per person.

Pritchett goes on to compare the gains from \$1 billion spent in Ethiopia on the best-practice targeted anti-poverty programme to the estimated gains from aggregate growth accelerations (and losses from decelerations) around the world. His results are presented in the figure below; in a nutshell, he finds that the gains from a billion dollars invested in an anti-poverty program are a factor of 100 to a factor of 1000 smaller than the gains and losses from growth episodes (!).



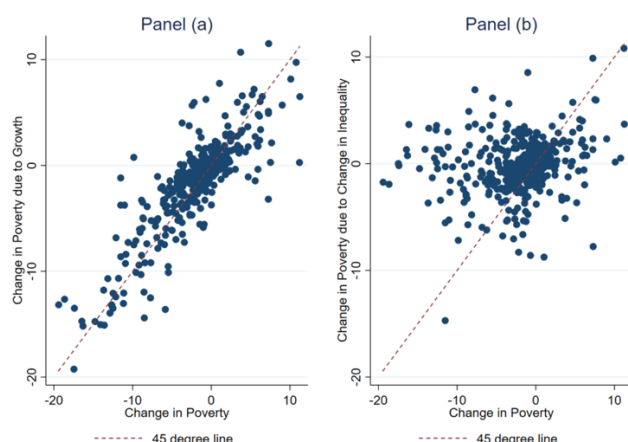
Concludes Pritchett (2018):

[S]ustained rapid economic growth in developing countries ... can also produce cumulatively enormous gains. And avoiding growth collapses/stagnation can prevent enormous losses. ... [I]nvestments that could bring that about more sustained growth (both more sustained accelerations and fewer sharp and extended decelerations) could also have astronomical returns. (p.27)

Bergstrom (2022) revisits and updates this literature using data from 1974-2018 for 135 countries. Hold on to your seats because her results are a little bit subtle (!). She finds that for most countries, a 1 percent reduction in inequality, as measured by the standard deviation of log income, leads to a *larger* reduction in poverty relative to a 1 percent increase in mean income. In other words, the average inequality elasticity of poverty (which she estimates to be 5.19 in the post-2010 data) is greater than the growth elasticity of poverty (2.78), and these averages disguise considerable heterogeneity across countries. Nevertheless, 90% of the variation in changes in poverty can be explained by changes in *mean incomes* (i.e. growth) because the average changes in mean incomes is an order of magnitude larger than changes in inequality. This conclusion is represented in the plots below from Bergstrom (2022): observed changes

in poverty are much better explained by the change in poverty due to growth than the change in poverty due to change in inequality:

Figure 7 Decomposing Percentage Point Changes in Headcount Poverty



This brings us right back to Quah's original point – inequality matters (a lot), but because percentage changes in mean income (i.e. growth) are in general so much larger than percentage changes in income inequality, differences in aggregate growth are *in practice* much more powerful drivers of changes in poverty than are changes in income distribution.

Lastly, it is worthwhile to point out that while research is ongoing, *none* of the empirical papers that I have seen have found any strong evidence of average poverty-increasing effects of aggregate growth at the country level. Of course, this does not preclude the very real possibility that some kinds of growth could hurt some people – and we will look at a number of cases of this over the next two months.

Relationship of Growth and Inequality

Although it seems that aggregate growth generally dominates any changes in within-country inequality in such a way that most growth is pro-poor, this result does not preclude the possibility that growth *could* negatively (or positively) affect income distribution within a country, and this may be of policy importance.

The evidence here is very mixed. Some papers have found a negative relationship, but others have found a zero, nonlinear or even positive relationship between inequality and growth. Indeed, early on, Lundberg and Squire (2001) and Banerjee and Duflo (2000) both made the fundamental point that inequality is *jointly determined* with growth, and as with any endogenous relationship, without correcting for this endogeneity (with a clever identification strategy) one cannot expect a stable empirical relationship between the two variables. As a result, empirically they would not expect to find a robust average relationship between these two variables as any results hinge

on what kind of data are used and on fragile assumptions about the functional form of the relationship – a conclusion from first principles that has stood the test of time.

Another, completely different line of research examines the long-run relationship between growth and inequality, not just short run correlations from the past 30 years as the above papers (see, for example Easterly 2007). Unlike the studies on the short run relationship, these long run studies tend to find quite a strong correlation between initial inequality and current gaps in income per capita (current income per capita is the result of growth over a long time ... we're talking several hundred years here). The mechanism seems to be that the more unequal a country was when it was founded, the worse its institutional quality and hence the worse its long run growth. We will examine this hypothesis more in depth in the next two weeks when we consider the importance of institutions, and how a revolution in studying history in the past two decades has produced a number of significant insights about long run economic growth.

II. Problems with measuring economic growth

Conceptually it is clear that measures of economic growth do not always correspond to what we might want to think of as positive (as in cheerful) 'development.' GDP estimates do not take into account the reduction of finite stocks of resources or the pollution of the environment. They count all transactions as positive, even if they are associated with misery. They fail to account for non-market activity such as household work and most childcare.

An related and interesting line of research has investigated the relationship between income and subjective well-being ('happiness'). Does increasing economic prosperity increase happiness? While research is ongoing, a recent ('adversarial collaboration') study, Killingsworth, Kahneman and Mellers (2022), finds that among happy people, increased income does increase happiness, and that this relationship does not appear to plateau out as the previous research of one of the coauthors (Kahneman) had suggested. However this is an average result across adults in a wealthy country – it does not necessarily follow that increasing income will increase happiness in all cases, and indeed other studies – such as an analysis done by the Economist Magazine in 2019 – suggest that the relationship between aggregate income and aggregate happiness within countries could be quite heterogeneous across countries.

All these shortcomings of measures of GDP are well known, but despite this it is hard to agree on a superior alternative. Many 'alternative GDP' measures have been proposed, but these tend to rely on subjective notions of what to include and what to subtract and invariably there is no universal consensus on a common methodology. What is perhaps less well appreciated is how poorly *plain old ordinary* GDP can be measured in many developing countries, potentially leading to very misleading pictures of overall global growth and inequality.

Relative to developed countries, in a typical developing country a much smaller fraction of economic activity is conducted within the formal sector, the degree of economic integration and price equalization across regions is lower, and the government statistical infrastructure is much weaker.

These factors make the calculation of nominal GDP (total value added, in domestic prices) difficult. Making useful comparisons of real GDP, either over time or between countries, also requires the construction of price indices: either a domestic price index to measure real income growth within a country, or purchasing power parity exchange (PPP) rates based on prices for a comparable set of goods to make inter-country comparisons.

However, in his paper ‘The African Growth Miracle’ Young (2012) notes:

- Penn World Tables purchasing power parity data set ... provides real income estimates for 45 sub-Saharan African countries, in 24 of those countries there has actually never been any benchmark study of prices.
- The on-line United Nations National Accounts database provides GDP data in current and constant prices for 47 sub-Saharan countries for each year from 1991 to 2004, the UN statistical office which publishes these figures had, as of mid-2006, actually only received data for just under half of these 1410 observations and had, in fact, received no constant price data, whatsoever, on any year for 15 of the countries for which the complete 1991-2004 on-line time series are published.
- Consumption measures for most developing countries are derived as a residual, after subtracting the other major components of expenditure from production side estimates of GDP.
 - Production side estimates of subsistence and informal production and other untaxed activities are, however, very poor, leading to gross errors in the calculation of consumption levels. Thus, for example, the first national survey of the informal sector in Mozambique in 2004 led to a doubling of the GDP estimate of nominal private consumption expenditure.

When alternative measures of economic growth are used, sometimes a dramatically different picture emerges, especially in the poorest countries. For example,

Young (2012) reports that measures of real consumption based upon the ownership of durable goods, the quality of housing, the health and mortality of children, the education of youth and the allocation of female time in the household indicate that sub-Saharan living standards have, for the past two decades, been growing in excess of 3

percent per annum, i.e. ***more than three times the rate indicated in international data sets.***

In their paper “Measuring Economic Growth from Outer Space” Henderson et. al. (2012) use changes in night lights to measure growth. Most of their estimates came in above the traditional estimates from GDP, but not all. As nightlight data is readily accessible both across the globe and over time for the last decade or two, using nightlights as a proxy for economic growth has become a popular and common technique in economic research. Deriving estimates from satellite images allows you to calculate the rate of growth or compare levels of wealth across any geographic area you want, not just the pre-defined political boundaries determined by statistical offices.

Increasingly, **Big Data** from administrative micro datasets allows now-casting and measurements of economic activity at much higher levels of granularity. Already, some startling differences between these and more traditional data are starting to emerge – for example when it comes to tracking changes in inequality (e.g. GRID data from **Guvenen et al. (2022)**).

Economists have understood for some time that there are large discrepancies between the income estimates from household surveys and from aggregate regional measures of income – in particular the surveys tend to underestimate income. **Pinkovskiy et al. (2024)** make an important point this income-understatement does not occur evenly across all households but varies in systematic ways across the income distribution, and that the pattern of these biases has also been shifting over time, and in particular underreporting of income by the bottom 50% of the world income distribution has become particularly important in recent decades.

When the authors adjust income estimates for these changes over time in under-reporting of income among lower income households, they reconfirm the findings of the previous literature, that global poverty and inequality have declined dramatically between 1980 and 2019, but they find these patterns of declining inequality and poverty reduction to be much stronger than in previous data. In particular they conclude:

“Population-weighted within-country inequality has declined since the mid-2000s to attain levels of the early to mid-1990s. ... The world distribution of is less defined by a large "precariat" modestly above an extreme poverty line but liable to fall back into destitution following a global shock, but rather increasingly by a true "global middle class" that is not poor even by upper-middle- income country standards. “

III. Economic Growth in the Far Distant Past (following Galor and Weil (2000))

Thus the evidence suggests that aggregate *per capita* economic growth is critically important for poverty reduction. With all the attention on the growth experiences of countries in the past 15, 30, 50 or maybe 100 years (if we are economic historians), however, it is easy to lose sight of the fact that per capita economic growth is itself an incredibly new phenomenon in the history of human habitation on earth.

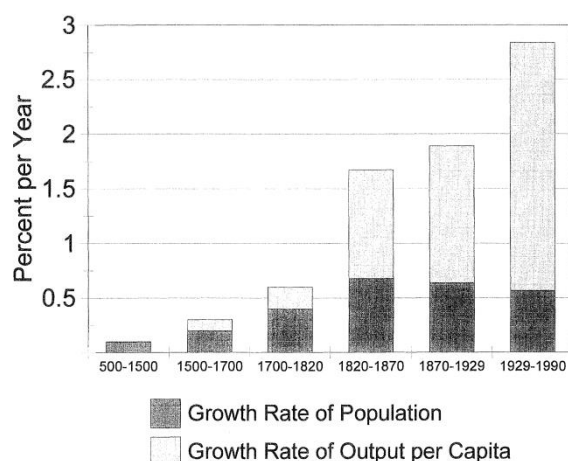


FIGURE 1. OUTPUT GROWTH IN WESTERN EUROPE, 500-1990

Source: Galor and Weil (2000)

For thousands of years, the standard of living was roughly constant and did not differ greatly across countries. Mokyr (1990), Pritchett (1997) and Lucas (1999) argue that even in the richest countries, the phenomenon of sustained growth in living standards is only a few centuries old.

- Maddison (1982) estimates that the growth rate of GDP per capita in Europe between 500 and 1500 was zero.
- Lee (1980) reports that the real wage in England was roughly the same in 1800 as it had been in 1300.
- Chao (1986) reports that real wages in China were lower at the end of the eighteenth century than they had been at the beginning of the first century.
- Massimo Livi-Bacci (1997) estimates the growth rate of world population from year 1 to 1750 at 0.064 percent per year.

In 1776 Adam Smith declared, “The most decisive mark of the prosperity of any country is the ***increase in the number of its inhabitants.***” Indeed for most of human history the struggle was to maintain and increase population numbers, not to improve living standards.

Stage I: Malthusian Growth

In 1798 Thomas **Malthus** proposed a theory of the relationship between population growth and income. The Malthusian growth model has two key components:

- The first is the existence of some factor of production, such as land, which is in **fixed supply**, implying decreasing returns to scale for all other factors.
 - Since land is fixed and finite, when population size is large, the standard of living will be low, and population will be reduced by either the “preventive check” (intentional reduction of fertility) or by the “positive check” (malnutrition, disease and famine).
- The second is a **positive effect of the standard of living on the growth rate of population**
 - Whenever wages rise above subsistence, they are eaten away in an orgy of procreation: people marry earlier and have more children, which depresses the wage to its biological minimum. Thus in the long run, the endogeneity of population keeps per capita income at some stagnant subsistence level.

Today, it seems absurd to us that people’s first reaction to a bit of extra income would be to run out and have more children (!). Is there any evidence that these kinds of effects actually ever existed? You can imagine that it is not easy to find any concrete evidence of this sort, but where people have managed to look they have indeed found it. For example,

- Lee (1997) reports positive income elasticities of fertility and negative income elasticities of mortality from studies examining a wide range of preindustrial countries.
- Wrigley and Schofield (1981) find that there was a strong positive correlation between real wages and marriage rates in England over the period 1551-1801.
- Negative shocks to population, such as the Black Death, were reflected in higher real wages and faster population growth (Livi-Bacci, 1997)

In fact the Malthusian model's predictions are consistent with the evolution of technology, population, and output per capita for **most** of human history, until relatively recently...

The Malthusian model implies that, in the absence of changes in technology or in the availability of land, the size of the population will be self-equilibrating. Further, ***increases in available resources will, in the long run, be offset by increases in the size of the population***. Thus malthusian theory produces a second, very particular **testable hypothesis**:

- Countries with superior technology will have denser populations, but the standard of living will not be related to the level of technology, either over time or across countries. In other words, **differences in technology should be reflected in population density but not in standards of living**.

This prediction is counter-intuitive and quite surprising compared to what we observe today. However, strikingly, what evidence there is does bear out this prediction quite well.

In particular, Easterlin (1981), Pritchett (1997) and Lucas (1999) all argue that prior to 1800, differences in standards of living among countries were quite small by today's standards; yet there did exist wide differences in technology. For example,

- China's sophisticated agricultural technologies, for example, allowed high per-acre yields, but failed to raise the standard of living above subsistence.
- Similarly in Ireland a new productive technology – the potato – allowed a large increase in population over the century prior to the Great Famine without any improvement in standards of living (Livi-Bacci 1997).

As a result of all this evidence, Kremer (1993) argues that **changes in the sizes of historical populations can be taken as a direct measure of technological improvement**.

Stage II: Post-Malthusian Growth

In the seventeenth and eighteenth century per capita income starts to accelerate slowly, but the ***initial effect of faster income growth in Europe was to increase population***. Population growth thus starts to accelerate and as a result Income per capita rises much more slowly than does total output.

- The growth rate of total output in Europe was 0.3 percent per year between 1500 and 1700, and 0.6 percent per year between 1700 and 1820.

- In both periods, two-thirds of the increase in total output was matched by increased population growth, so that growth of income per capita is only 0.1 percent per year in the earlier period and 0.2 percent in the later one.

During this Post-Malthusian Regime, the Malthusian mechanism linking higher income to higher population growth **continued to function**. However the effect of higher population on diluting resources per capita, and thus lowering income per capita, was **counteracted** by technological progress, which allowed income to keep rising.

Stage III: Demographic Transition

Both population and income per capita continued to grow after 1820, but increasingly the growth of total output **was expressed as growth of income per capita**. Indeed, whereas the rate of total growth increased, **the rate of growth of population peaked in the nineteenth century and then began to fall**.

For next week...

How can we explain the emergence from the Malthusian trap and the onset of the demographic transition? Let's hold on to that thought and come back to it later in the lecture after having reviewed some of the basic growth theories.