Economic Growth

These notes are divided into three parts. First, they discuss some important observations about growth rates over time and across countries. Second, they summarize a few of the most important drivers of growth that economists largely agree on. Third, they discuss a formal macroeconomic model of the semester, the classic Solow Model of Growth. We will analyze this model entirely through graphs.

Some Observations About Growth

1. Sustained growth is a relatively recent phenomenon. The human race is about 200,000 years old. For most of its existence, humanity has existed close to *subsistence*. This is the level of output needed to just survive (several hundred dollars per year, per capita). At this level, temporary reductions in output may push society into famine.

Despite considerable technological advancement, most of the earth's population remained close to subsistence until just a few centuries ago. This shows that the annual per-capita growth rate was very close to 0. This led to the *Malthusian* view of economics. This claims that any surplus output will be absorbed by additional population so that per capita output remains close to subsistence. This bleak outlook earned economics the nickname "the dismal science," a name reinforced by the last midterm. The Malthusian outlook has not held up well in recent centuries. There are, however, some neo-Malthusians who expect growth to be temporary and society to return to a subsistence level eventually.

Table 1 shows growth since 1900 for a set of countries. It is useful for my next three observations:[1]

2. Seemingly small differences in growth rates can have massive effect in the very long run. Consider Japan and the Philippines. In 1900, these countries had similar levels of GDP. since

[1] Source for 1900 data: www.nationmaster.com. I am skeptical of these data as they are missing the United Kingdom which surely would have been among the wealthiest countries in 1900. Source for 2013 data: International Monetary Fund.

Table 1: Growth Since 1900

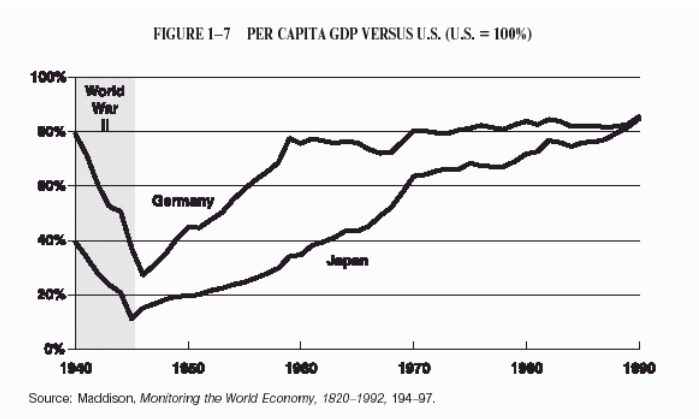
Country	1900 GDP (2013 $)	1900 Rank	2013 GDP ($)	2013 Rank	Annual Growth
New Zealand	4320	1	33,626	32	1.83%
Australia	4299	2	45,138	14	2.10%
USA	4096	3	53,001	10	2.29%
Belgium	3652	4	40,760	24	2.16%
Netherlands	3533	5	46,440	13	2.31%
Switzerland	3531	6	53,977	9	2.44%
Germany	3134	7	43,475	17	2.35%
Denmark	2902	8	59,129	6	2.70%
Austria	2901	9	44,402	14	2.44%
France	2849	10	39,813	26	2.36%
Canada	2758	11	52037	10	2.63%
Argentina	2756	12	22,363	24	1.87%
Sweden	2561	13	43,407	18	2.54%
Japan	1135	23	36,654	27	3.12%
Philippines	1033	24	6,597	120	1.65%

1900, Japan has grown at an annualized rate of over 3% while the Philippines has only grown at 1.65%. A a result, Japan remains a very wealthy country while the Philippines is now just the 120th wealthiest nation. A 1.5% in the level of output would not fundamentally change the state of an economy. But a 1.5% reduction in growth, sustained for a long enough time, can.

3. "Growth miracles" refer to cases where a country experiences rapid growth that allows it to improve it relative (compared to other countries) economic position. Two older examples are West Germany and Japan in the aftermath of the Second World War. Following the destruction of much of their capital stocks, these economies experienced decades of high growth that allowed them to almost catch up with the richest economies in the world. Figure 1 shows the postwar recoveries of

Japan and Germany:[2]

Figure 1: Postwar Recoveries



The German and Japanese experience indicates that countries may experience exceptional growth while "catching up." It is doubtful that the wealthiest economies could match this growth.

Other growth miracles include East Asian economies such as Singapore and Taiwan. It appears plausible that China is in the earlier stages of such an event. China's economy since the early 1980s, when it moved away from a Marxist economy towards a capitalist one, has often experienced growth rates well above 3%. This does not imply that China will continue these growth rates so that per capita GDP will exceed that of the United States. Instead, it is far more likely that these growth rates will slow down as China catches up.

[2]Taken from http://www.efficientfrontier.com. Maddison. "Monitoring the World's Economy, 1820-1992." 194-197.

4. "Growth disasters can also occur. Examples include Argentina, which was once among the richest countries in the world, and the Philippines whose relative economic standing has declined due to decades of disappointing growth. Growth disasters can occur for a number of reasons including political instability, and poor macroeconomic management.

Important Drivers of Growth

We now consider a few of the factors that the literature, both theoretical and empirical, strongly suggests have large effects on growth. This list is not exhaustive, other factors that have been examined include language and religion. The ones on the following list are very intuitive:

1. Technology. This is obviously the biggest contributor to global economic growth. Technological innovation allows a certain set of inputs (labor, capital, energy, etc.) to produce more output. Technology refers to not just the creation of new equipment and production methods. It also includes how deeply a technology has permeated an economy. North Korea, for example, has access to modern computers. But their number is so limited that they do little for that economy.

Growth economists have not settled on why technology progresses. One view is that its progress is largely exogenous. In this case, there is little that policy makers can do to affect technological progress. Another view is that technological progress results from agents choosing how much research to conduct and that policies which incentivize research might thus meaningfully improve technological innovation. Every one of my papers, for example, doubles global GDP.[3]

2. Human capital. Imagine a certain amount of technology, labor, capital, etc. Human capital is anything that makes this labor more productive without affecting any other input. Education is the most important aspect of human capital. Clearly one goal of education is to create a more productive workforce.

3. Investment. Recall that investment is the creation of new capital. Capital is an input in the productive process. As investment increases, so does capital and output. This reasoning is the

[3]Unfortunately, every time I publish one, something else happens that cuts GDP in half. So it looks like there is no effect even though there obviously is.

motivation for why many governments, including the United States, give capital income favorable tax treatment compared to labor income. Note that investment encompasses both privaye and public purchases of capital.

4. Institutions. These are structures in the economy that encourage investment, research and development, or other behaviors that promote growth. An obvious example is a legal system that protects property rights and enforces contracts. Other institutions may be political, there is evidence that democracy, up to a point, promotes growth.[4]

5. Everything else. Growth economists have studied a wide variety of other factors including those related to geography, climate, religion, etc. Unlike the previous four, however, there is not a clear consensus on whether these variables cause higher or lower growth.

[4]Although very high amounts of democracy might reduce growth, this is not the same as saying that too much democracy is bad. Growth is not welfare.