- ▶ Next Week Professor Eichengreen will discuss
  - ▶ Gregory C. Chow, "How and Why China Succeeded in Her Economic Reform,"
  - ▶ Yiping Huang and Bijun Wang, "Rebalancing China's Economic Structure,"
  - ▶ Barry Eichengreen, Donghyun Park and Kwanho Shin, "When Fast Growing Economies Slow Down: International Evidence and Implications for China."

- ▶ This Week John and Vladimir will discuss
  - ▶ Why studying China may be important
  - ▶ Some important facts about growth
  - ▶ Basics of growth accounting
  - ▶ Solow growth model

Motivation

- Why China?
  - About a fifth of world population (1.4 out of 6.8 billion).
  - Large economy and an important player in world economic and political affairs (about 10% of World GDP).
  - Example of a poor country graduating to a status of middle income country (and possibly more).
  - Example of a successful transition from a centrally planned to a market based economy (contrast to ex-USSR countries).

Motivation

Figure: China relative to World (from IMF WEO)
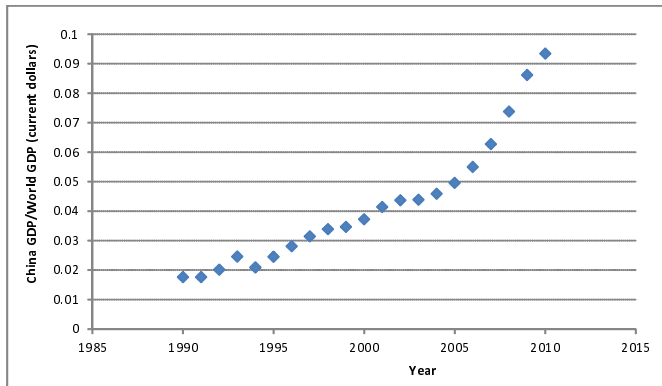
Motivation

- Questions:
  - What are the reasons for the rapid rise of China? (Chow 1985)
  - Is rapid economic growth sustainable in China? (Eichengreen et al. 2011)
  - If yes, then great! If not, what can be or is being done to sustain it? (Huang et al. 2010)
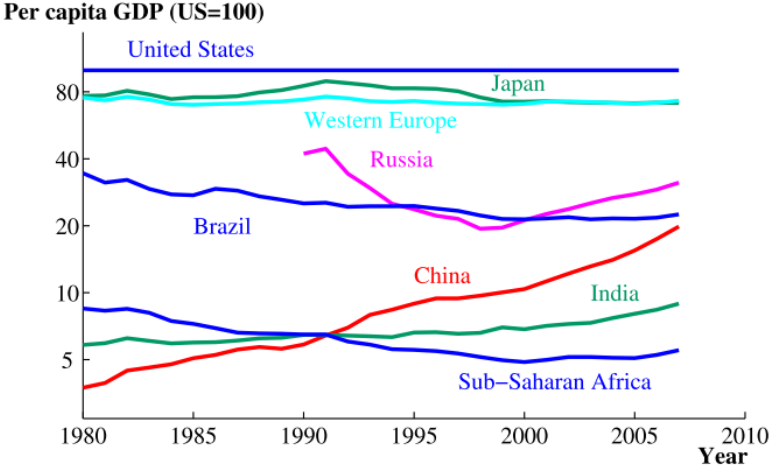 - Are there lessons to be learned for other nations?

Motivation
Kaldor Facts

▶ Fact 1: "There is enormous variation in per capita income across economies. The poorest countries have per capita incomes that are less than 5 percent of per capita incomes in the richest countries."

Motivation

Kaldor Facts

Figure: Incomes (from C. Jones)

- Fact 2: "Rates of economic growth vary substantially across countries."

Motivation

Table: GDP per capita growth rates (from IMF WEO)

|	1990 - 2000	2000 - 2010
World	0.016	0.029
Advanced Economies	0.016	0.021
Developing Asia	0.032	0.061
Latin America	0.025	0.036
Sub-Saharan Africa	0.002	0.051
China	0.053	0.069

► Fact 3: "Growth rates are not generally constant over time. For the world as a whole, growth rates were close to zero over most of history but have increased sharply in the twentieth century. For individual countries, growth rates also change over time."

Motivation

Figure: GDP per capita (from A.Maddison)
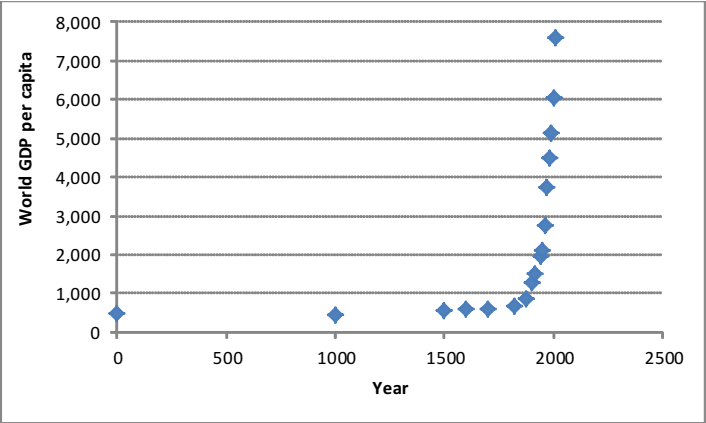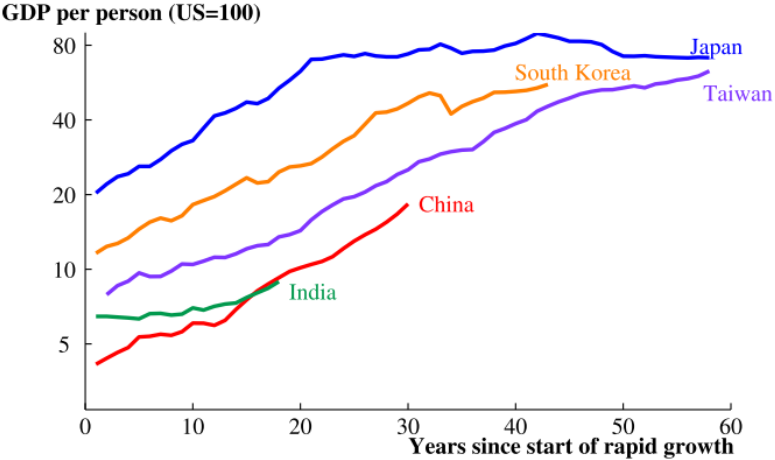
- Fact 4: "A country's relative position in the world distribution of per capita incomes is not immutable. Countries can move from being "poor" to being "rich," and vice versa."

Motivation

GDP per person (US=100)

Japan

South Korea

Taiwan

China

India

Years since start of rapid growth

Growth Accounting

- What explains these facts? Is there a general framework to analyze the determinants of incomes?
- Growth Accounting

Growth Accounting

Basics

- Production Function

$$Y(t) = F(K(t), A(t) L(t))$$

where $K(t)$, $L(t)$, $A(t)$ denote a country's stock of capital, number of workers, and state of technology respectively.

- Constant Returns to Scale (Cobb-Douglas)

$$F(cK, A(cL)) = cF(K, AL)$$

$$F(K, AL) = K^{\alpha} (AL)^{1-\alpha}$$

- Differentiate $F(cK, A(cL)) = cF(K, AL)$ with respect to c and plug $c = 1$

$$Y = F_K K + F_L L$$

where $\frac{F_K K}{Y} = \alpha$ and $\frac{F_L L}{Y} = 1 - \alpha$ with Cobb-Douglas.

Growth Accounting

- Take logarithms of $Y = K^{\alpha} (AL)^{1-\alpha}$

$$log(Y) = \alpha log(K) + (1-\alpha) log(A) + (1-\alpha) log(L)$$

- Determinants of cross-country income differences -

$$\Delta log(Y) = \alpha \Delta log(K) + (1-\alpha) \Delta log(A) + (1-\alpha) \Delta log(L)$$

and using the fact that $log(x/z) = log(x) - log(z)$

$$\Delta log\left(\frac{Y}{L}\right) = \alpha \Delta log\left(\frac{K}{L}\right) + (1-\alpha) \Delta log(A)$$

- Thus cross-country per capita income differences can be attributed to differences in per capita capital stock and to differences in technology

Growth Accounting
Basics

- Determinants of income growth over time -

$$\frac{d}{dt} log\,(Y) = \alpha \frac{d}{dt} log\,(K) + (1-\alpha) \frac{d}{dt} log\,(A) + (1-\alpha) \frac{d}{dt} log\,(L)$$

and use the Chain Rule $\frac{d}{dt} log\,(Y) = \frac{\frac{dY}{dt}}{Y} \equiv g_Y$ (same for A, L)

$$g_Y = \alpha g_K + (1-\alpha) g_T + (1-\alpha) g_L$$

- And Growth rate of GDP per capita is (again using that $log\,(x/z) = log\,(x) - log\,(z)$)

$$g_{Y/L} = \alpha g_{K/L} + (1-\alpha) g_T$$

Growth Accounting

Figure: Growth Accounting - China

Sources of China's Economic Growth Using Simple Solow Growth Accounting

	1978-2008	1978-1999	1999-2008
Contribution to GDP growth (%)			
Physical capital stock	44.96%	36.35%	67.62%
Labor	8.50%	10.78%	3.97%
TFP	46.54%	52.87%	28.41%

Growth Accounting

Figure: Growth Accounting (from Hall and Jones (1999))

TABLE I
PRODUCTIVITY CALCULATIONS: RATIOS TO U. S. VALUES

Country	Y/L	Contribution from		
		$(K/Y)^{\alpha/(1-\alpha)}$	H/L	A
United States	1.000	1.000	1.000	1.000
Canada	0.941	1.002	0.908	1.034
Italy	0.834	1.063	0.650	1.207
West Germany	0.818	1.118	0.802	0.912
France	0.818	1.091	0.666	1.126
United Kingdom	0.727	0.891	0.808	1.011
Hong Kong	0.608	0.741	0.735	1.115
Singapore	0.606	1.031	0.545	1.078
Japan	0.587	1.119	0.797	0.658
Mexico	0.433	0.868	0.538	0.926
Argentina	0.418	0.953	0.676	0.648
U.S.S.R.	0.417	1.231	0.724	0.468
India	0.086	0.709	0.454	0.267
China	0.060	0.891	0.632	0.106
Kenya	0.056	0.747	0.457	0.165
Zaire	0.033	0.499	0.408	0.160
Average, 127 countries:	0.296	0.853	0.565	0.516
Standard deviation:	0.268	0.234	0.168	0.325
Correlation with Y/L (logs)	1.000	0.624	0.798	0.889
Correlation with A (logs)	0.889	0.248	0.522	1.000