SIS 628
Jan. 16, 2019

INCOME

What is macro about?

- Macroeconomics is the study of income.
  - Why do incomes vary over time?
  - Why do they differ across countries?
  - Why do they differ among people?

- If we try to answer all these questions at the same time, we may not be any to answer any. So we take it one step at a time.

- First, we ignore variation among people within a country. We pretend that everyone within a country makes the average income of that country.

- Second, we make a distinction between short-run changes in income and long-run changes in income.

Income: Long Run vs. Short Run

- The long-run component of income is called the trend or potential income.

- Fluctuations around the trend or potential are the short-run component of income.

    - When income is above trend, the economy is said to be in the boom phase of the cycle or in an expansion; when income trend, the economy is experiencing a slowdown or a slump.

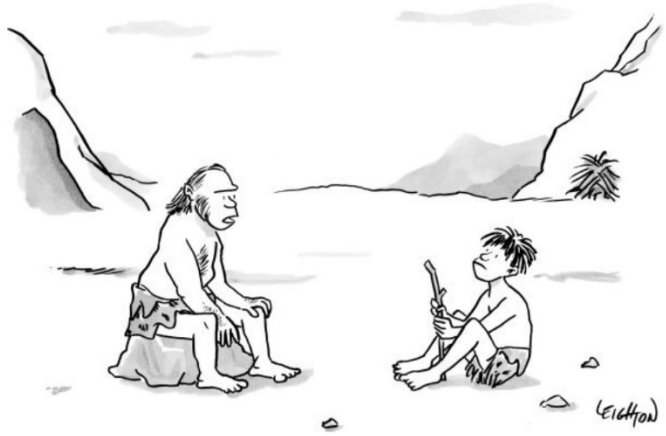
    - Output gap: the difference between income and its trend (or potential)
        - Negative output gap: income is below trend
        - Positive output gap: income is above trend

Very Important Warning about Jargon

- To drive you crazy, economists use four words that all mean broadly speaking the same thing: “income” “output,” “production” and “real GDP”.
- Then they totally drive you up the wall by talking about “growth”: you can assume they’re talking about “growth in incomes (or output or production or real GDP)” rather than spiritual growth.
- “Real GDP per capita” is the nerd’s way of saying “average income”
  - Example: “U.S. real GDP per capita is $40,000” is like saying “Average income in the U.S. is $40,000 a year”.

TREND INCOME

World Aggregate GDP over Time

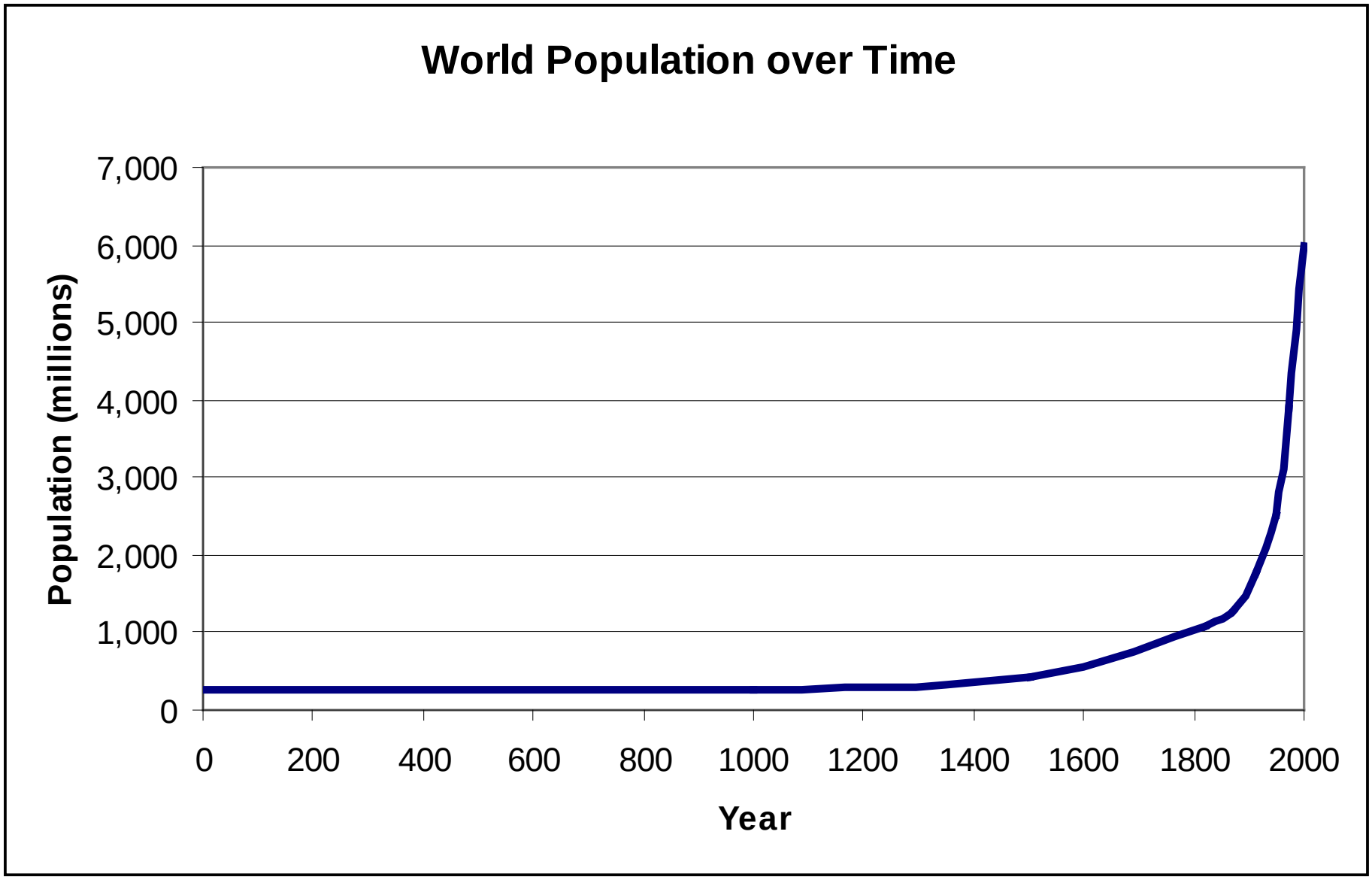


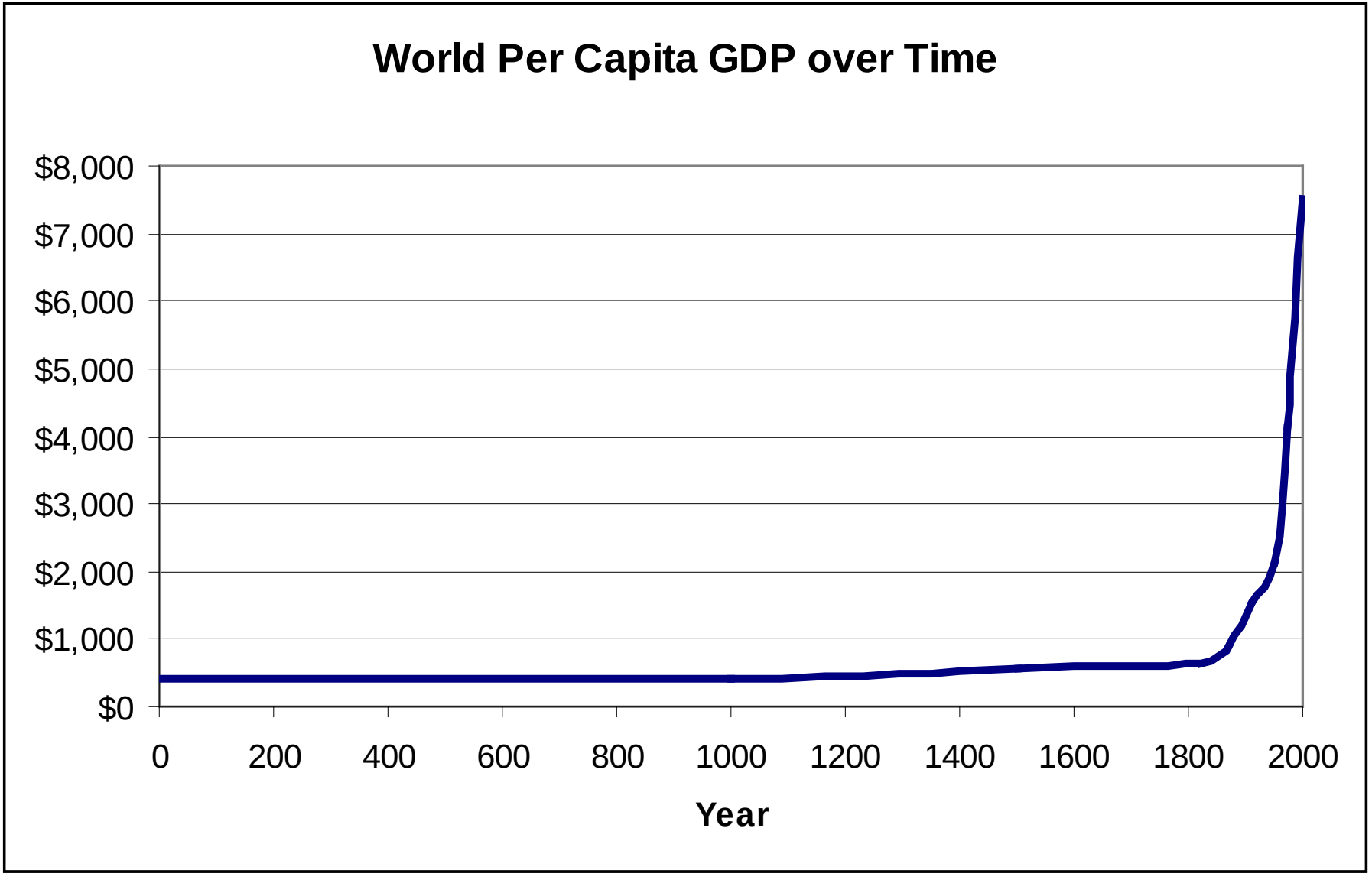
World GDP (Millions of $). Log Scale

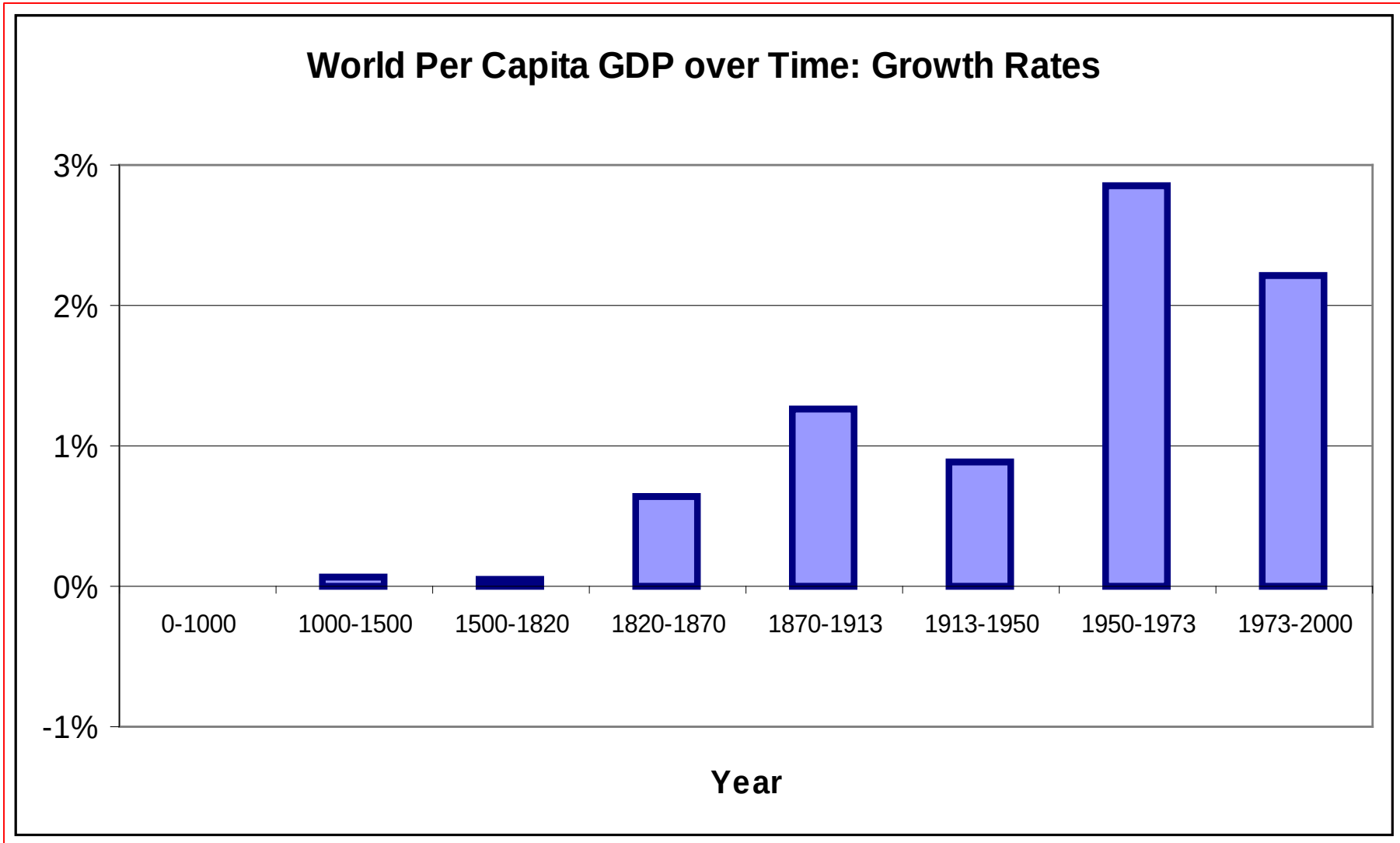
$19
$18
$17
$16
$15
$14
$13
$12
$11
$10

0 200 400 600 800 1000 1200 1400 1600 1800 2000

Year


World Population over Time
Population (millions)
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Year


World Per Capita GDP over Time
$8,000
$7,000
$6,000
$5,000
$4,000
$3,000
$2,000
$1,000
$0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Year


World Per Capita GDP over Time: Growth Rates
3%
2%
1%
0%
-1%
0-1000
1000-1500
1500-1820
1820-1870
1870-1913
1913-1950
1950-1973
1973-2000
Year

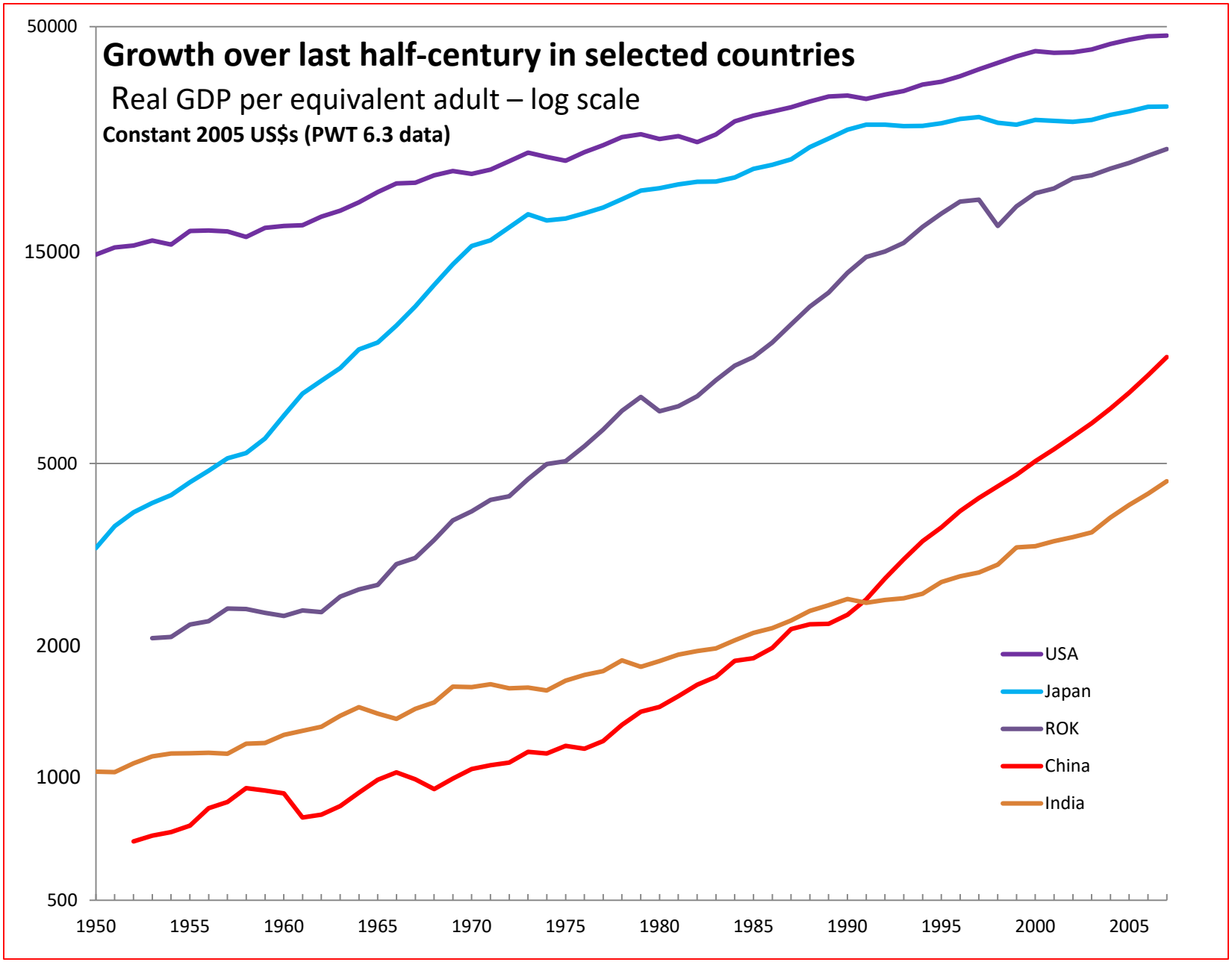

Growth over last half-century in selected countries
Real GDP per equivalent adult – log scale
Constant 2005 US$s (PWT 6.3 data)
50000
15000
5000
2000
1000
500
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
USA
Japan
ROK
China
India

Table 1: Growth Experiences Compared: Ghana, India, and Korea

	1956 Per Capita GDP (in 2000 PPP $US)	2003 Per Capita GDP (in 2000 PPP $US)	Average Per Capita Growth 1962-2003
Ghana	1,874	2,114	0.10%
India	900	2,732	2.54%
Korea	1,347	16,977	6.07%

Source: World Development Indicators and Groningen Growth and Development Center

GROWTH ACCOUNTING

Production Function: Output depends on Inputs and Technology

- Production Function: Y = A F(K, L)
  In English: Output (Y) depends on capital input (K) and labor input (L)
  Note: 'F' is often used by economists instead of writing out "depends on" (= "is a function of").

- The extent to which inputs deliver output depends on the level of "technology" (A)—the 'efficiency' with which inputs are used to produce output.

- Jargon alert: Economists refer to 'A' as 'total factor productivity' (and sometimes as the 'Solow residual')

- Growth in Output =
  Growth in total factor productivity
  + (share of capital * growth of capital)
  + (share of labor * growth of labor)

Average Income (or income per capita)

- Taking the production function: $Y = A\,F(K, L)$ and dividing through by L gives average incomes as:

$$Y/L = (A/L)\,f(K/L)$$

- Growth in average incomes =
  growth in TFP per worker
  + growth in capital per worker (also called "capital deepening")

An illustration: The Cobb-Douglas production function

$$Y_t = A_t \times (K_t)^{\alpha} (L_t)^{1-\alpha}$$

$$\frac{\Delta Y}{Y_t} = \alpha \frac{\Delta K}{K_t} + (1-\alpha)\frac{\Delta L}{L_t} + \frac{\Delta A}{A_t}$$

$$\frac{\Delta Y}{Y_t} - \frac{\Delta L}{L_t} = \alpha\left(\frac{\Delta K}{K_t} - \frac{\Delta L}{L_t}\right) + \frac{\Delta A}{A_t}$$

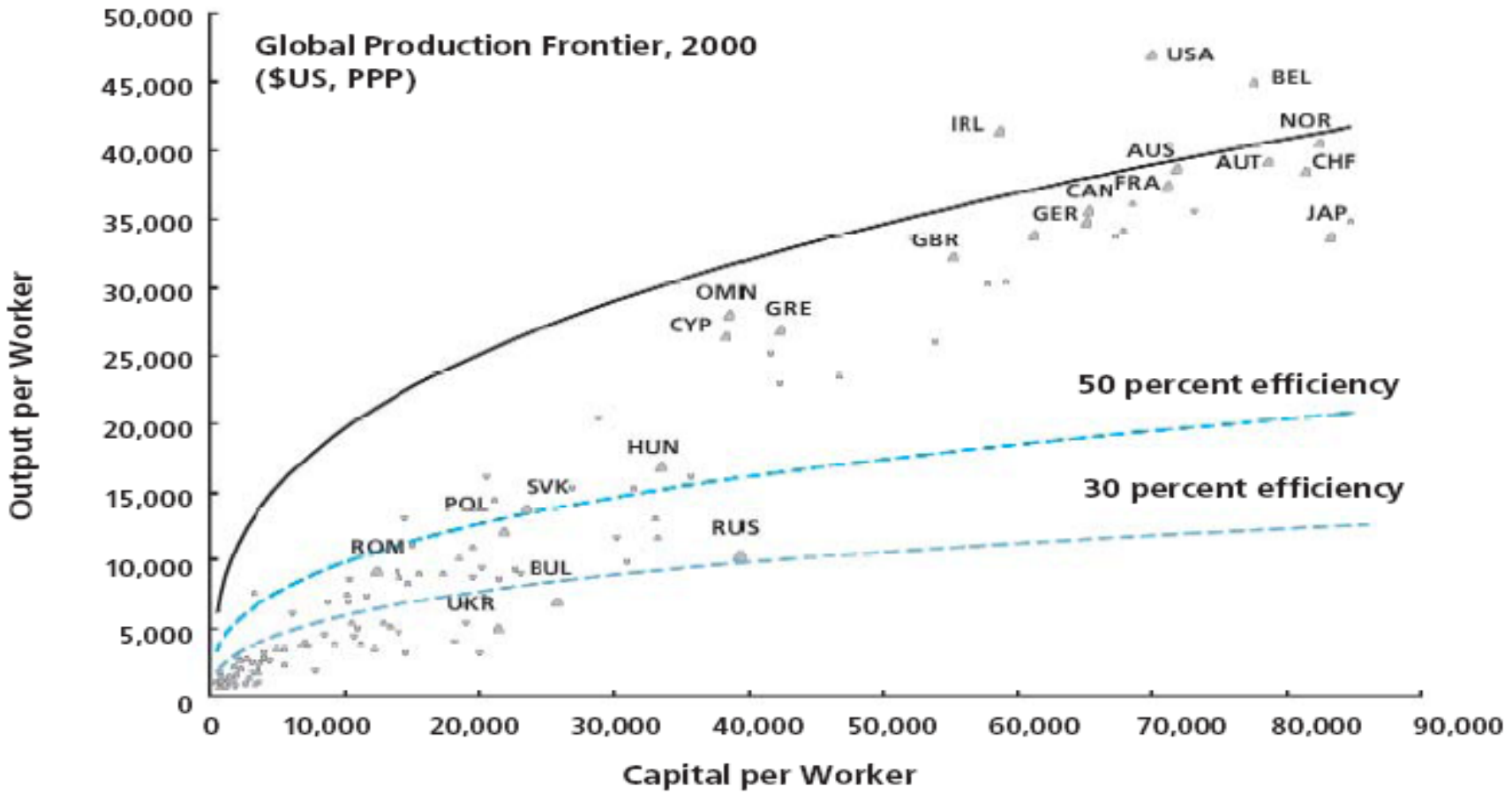
- The first line shows the Cobb-Douglas production function
- The second line is the growth accounting -- for growth in incomes
- The third line is growth accounting – for growth in average incomes

Growth accounting for the U.S., 1948-2000

	Annual Growth Rate of Y	Annual Growth Rate of Y/L	Contribution of K/L	Annual Growth Rate of A
1948-1973	4.0%	3.0%	1.2%	1.8%
1973-1995	2.7%	0.9%	0.8%	0.1%
1995-2000	4.2%	3.0%	1.1%	1.9%

$(\alpha = 0.4)$

Production Function & Role of TFP



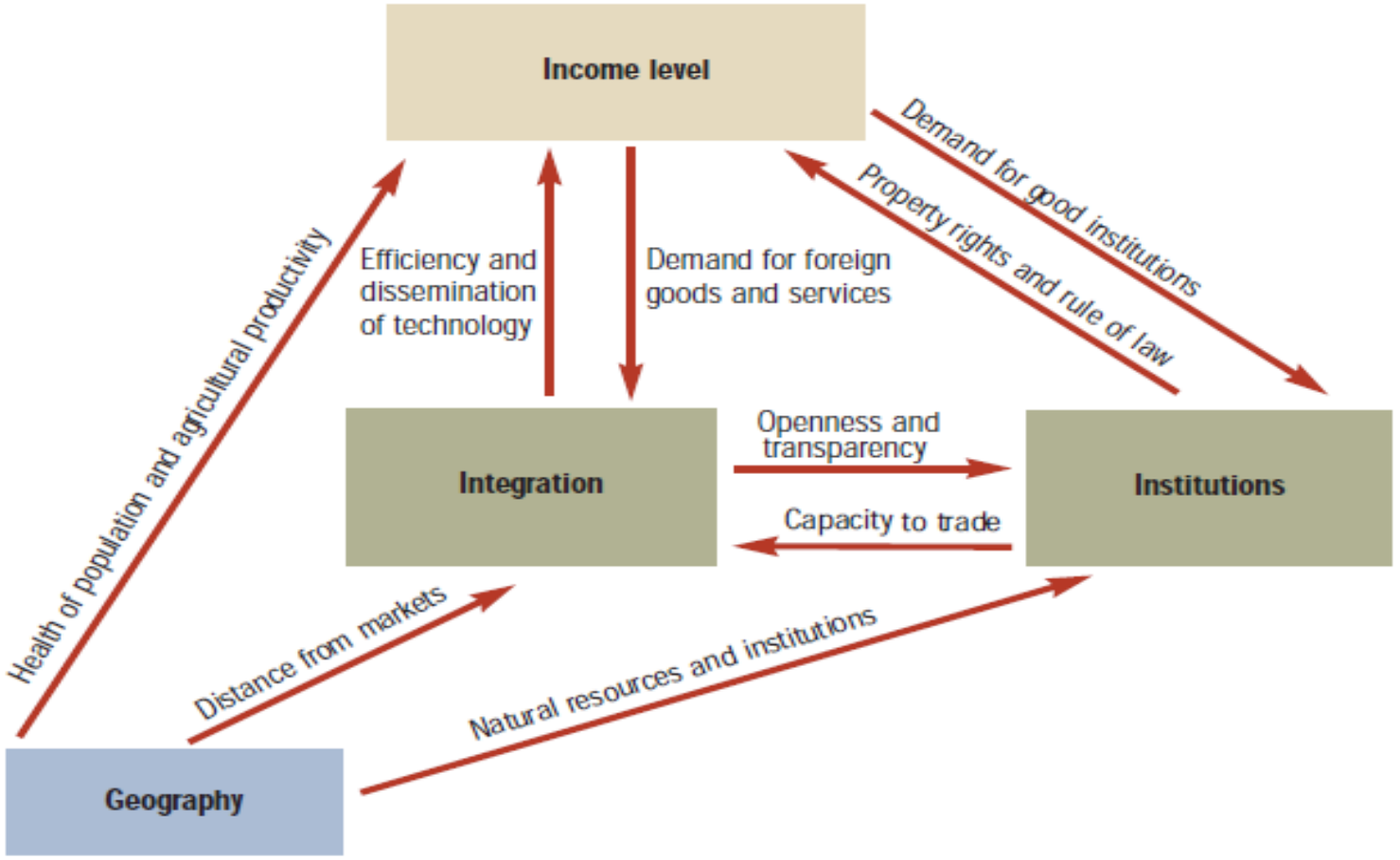
GROWTH: GOING BEYOND ACCOUNTING

A General View of Growth

- Y = F (Policies, Institutions, Geography, Shocks or Something Else)
- Policies
  - Macroeconomic Policies
  - Openness to trade
- Institutions
  - Extent of Rule of Law; Protection of Property Rights; Quality of Bureaucracy
- Geography;
  - Sachs: the “bad latitude” problem; Jared Diamond’s “guns, germs and steel”
- ‘Shocks’ (negative and positive)
  - Terms of trade shocks
  - Political conflict
  - Financial crises
- Something Else
  - Foreign Aid?
  - Resource Curse?
  - Expectations/Motivation?

Growth: Integration ("Trade Policies") vs. Institutions

Development and its determinants are related in multiple and complex ways, making the task of determining and quantifying causality difficult.



Growth Miracles

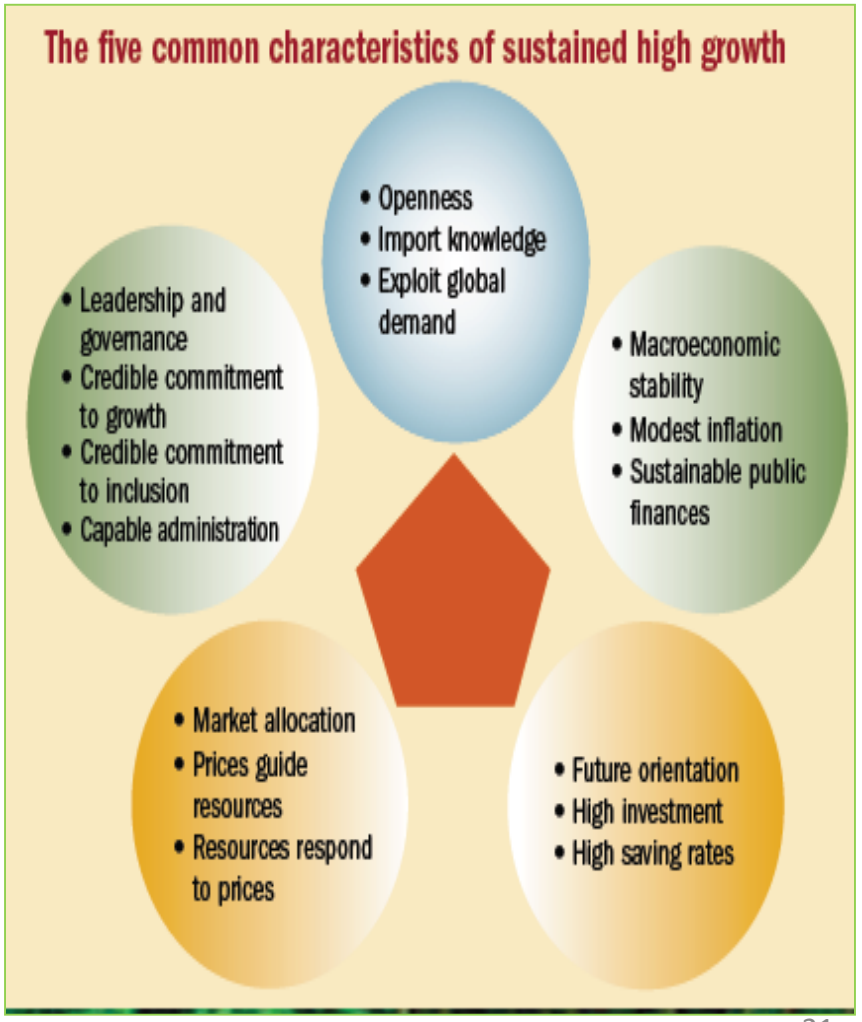
Sustained high growth in developing economies is a post-World War II phenomenon.

Economy	Period of high growth	Per capita income	
		At start of growth period	2005[1]
Botswana	1960–2005	210	3,800
Brazil	1950–1980	960	4,000
China	1961–2005	105	1,400
Hong Kong SAR	1960–1997	3,100	29,900
Indonesia	1966–1997	200	900
Japan	1950–1983	3,500	39,600
Korea	1960–2001	1,100	13,200
Malaysia	1967–1997	790	4,400
Malta	1963–1994	1,100	9,600
Oman	1960–1999	950	9,000
Singapore	1967–2002	2,200	25,400
Taiwan Province of China	1965–2002	1,500	16,400
Thailand	1960–1997	330	2,400

Source: World Bank, *World Development Indicators 2007*.

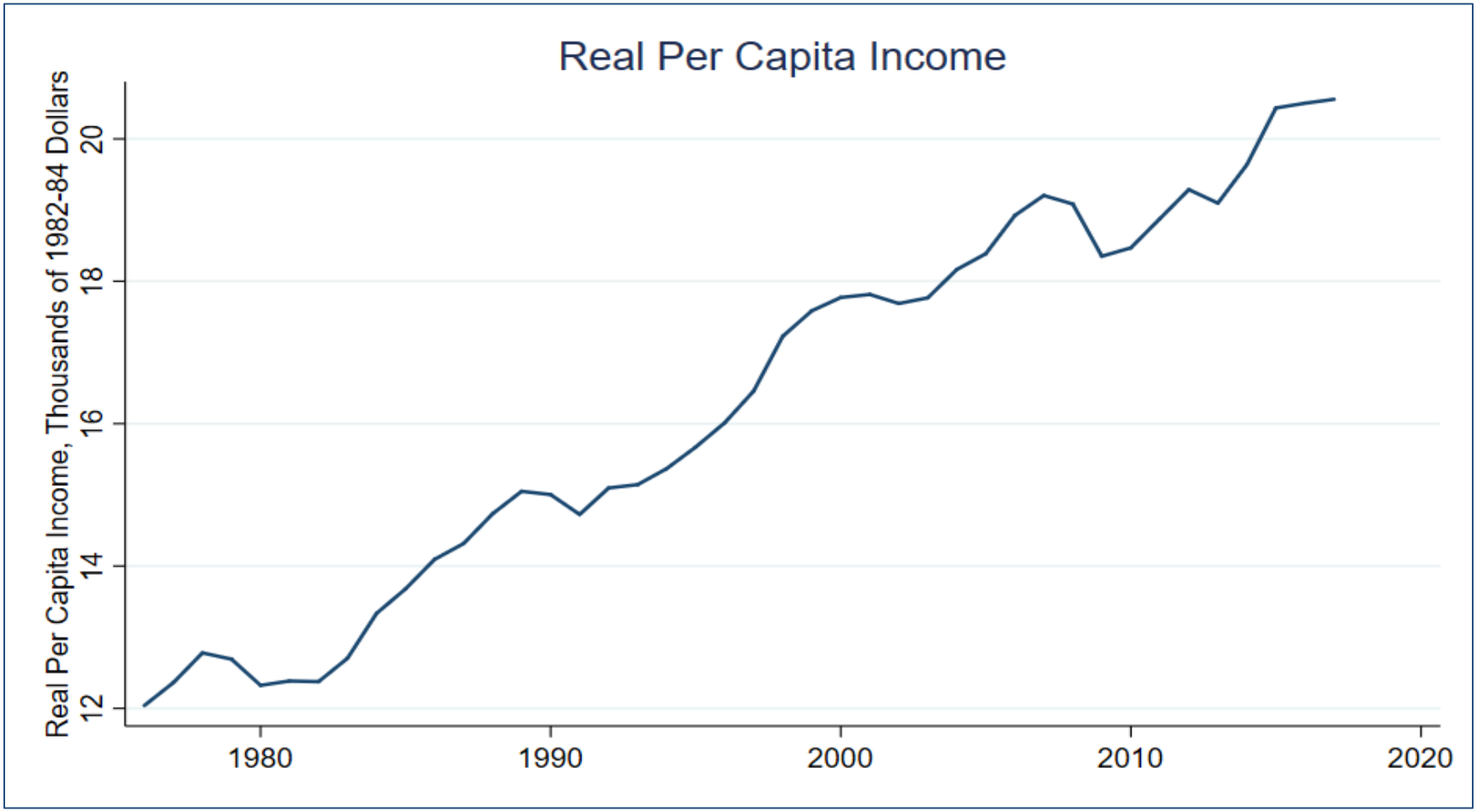
Note: A 7 percent cutoff was chosen because growth at these rates produces very substantial changes in incomes and wealth: income doubles every decade at 7 percent.

[1]In constant 2000 U.S. dollars.

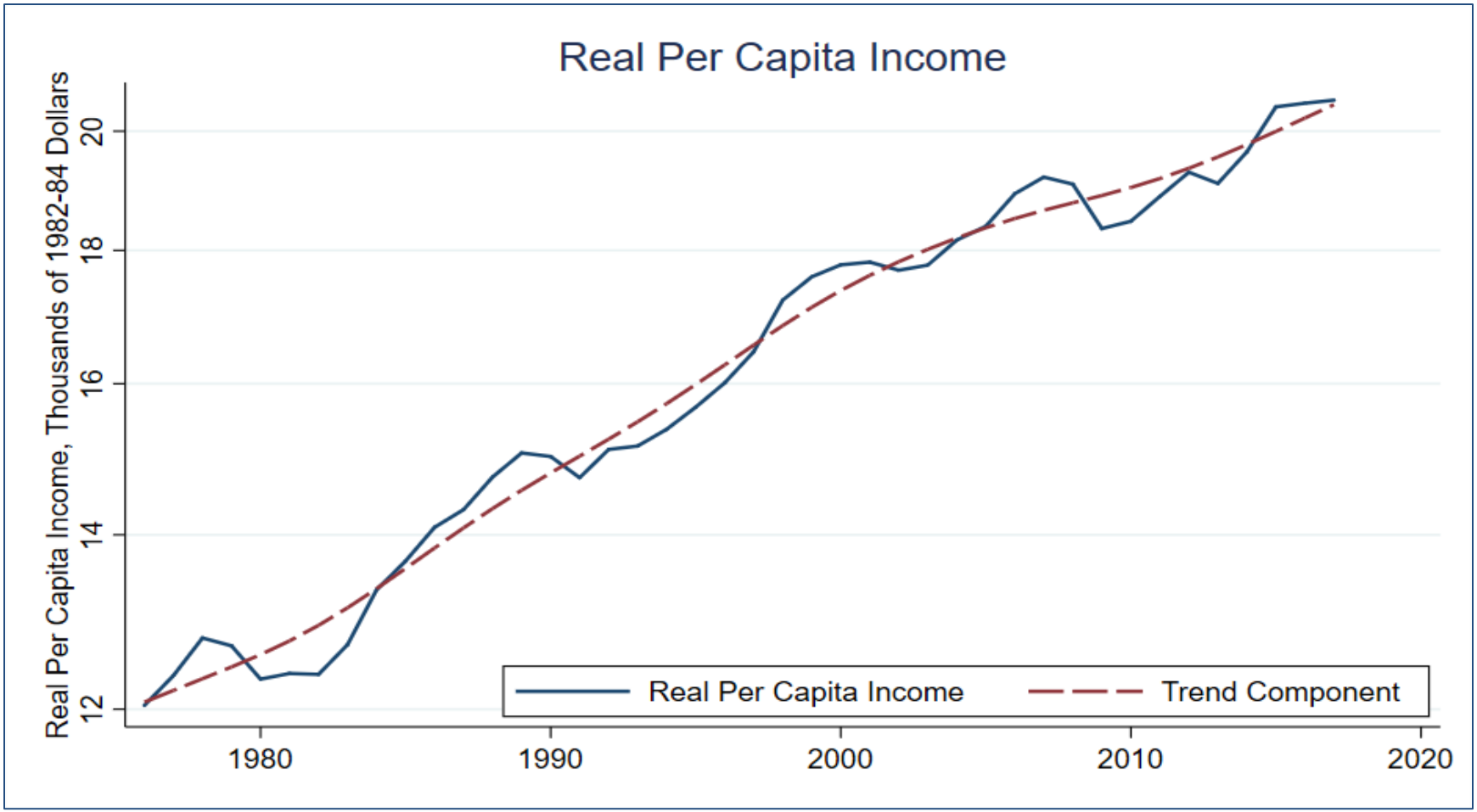


BUSINESS CYCLES

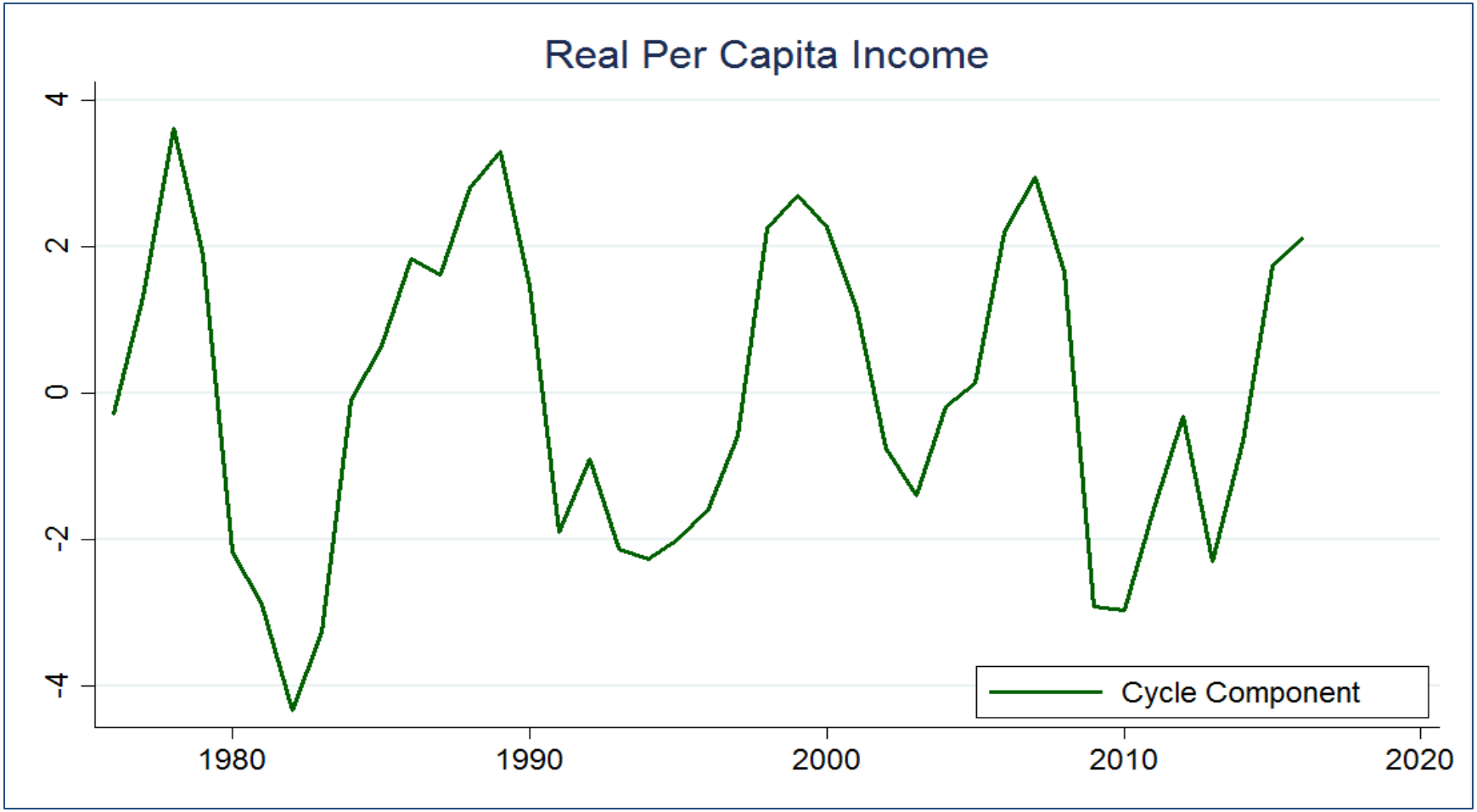
U.S. Real Per Capita Income



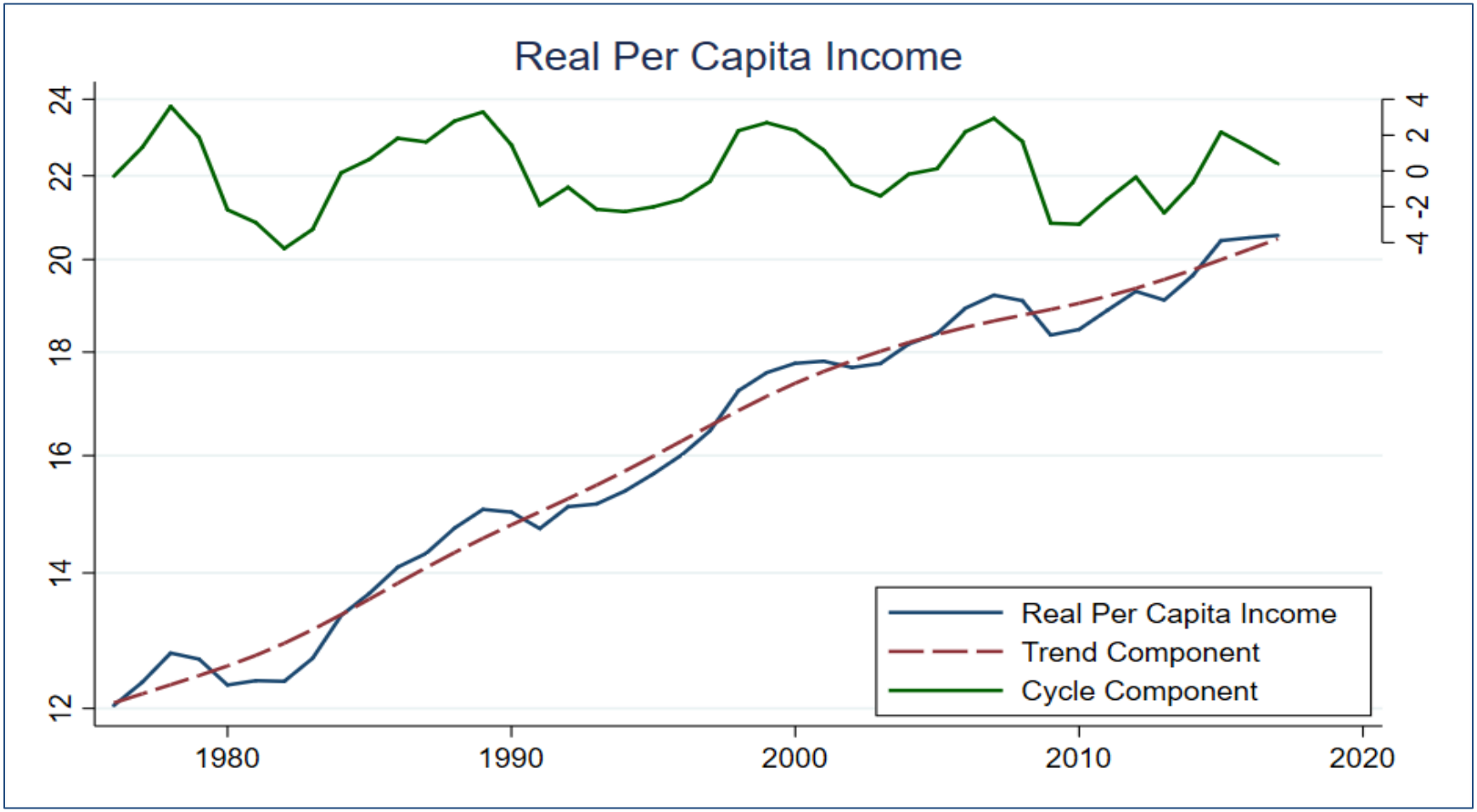
U.S. Real Income: Trend



U.S. Real Income: Cycle or **Output Gap** (income after removing trend)



Real Income: Trend and Cycle



Twin Goals of Economic Policies

1) Boost trend (“growth”)

2) Minimize cycles (“stabilization”)

Snapshot of mainstream advice

Policies	Long Run	Short Run	Criticism from the 'Left'	Criticism from the 'Right'
Monetary and exchange rate policies	- Keep inflation low and predictable - Countries are free to choose their exchange rate regime (but, in general, exchange rate flexibility can be good)	- Recognize that chosen exchange rate regime requires support from other policies - Countries with floating exchange rates can use interest rates to stabilize	- Advice too 'inflation-focused' and neglects goals of growth. - IMF not flexible enough on use of capital controls; too focused on exchange rate flexibility	- Advice permits devaluation as a way to overcome financial crises; creates problems of credibility
Fiscal Policies	- Taxation: expand tax base to generate sufficient revenues; advocacy of VAT - Expenditure: govt. spending essential to support private economy - Debt: keep it sustainable	- Let automatic stabilizers work	- Too worried about fiscal deficits & debt sustainability; not 'growth-friendly' - Tax advice (e.g. on VAT) is 'regressive' (hurts the poor)	- Allows too much build-up of debt in low-income economies, leading to periodic need for debt forgiveness,
Financial Sector Policies	- Well-capitalized banks - Well-regulated financial sector - Macroprudential policies	- counter-cyclical capital buffers?	- Not critical enough of financial sector inefficiency or excesses	- Complicit in 'bailouts', creating moral hazard
(Other) Structural Policies: Labor markets	- Aim for 'micro' and 'macro' flexibility while providing basic support to workers	- Let automatic stabilizers work (e.g. unemployment insurance benefits)	- Too focused on flexibility, not enough on support to workers	-- Too much protection, kills dynamism of labor markets
(Other) Structural Policies: Product markets	- Avoid excessive regulation; ensure competition; privatization	- Be cognizant of state of economy when introducing reforms	- Gets rids of regulation that protects workers & consumers	-- Throttles business, particularly small and medium enterprises.

Other economic indicators of interest

Main indicator of interest:

Real income per person (a.k.a. real GDP per capita or real output per capita)

Other economic indicators:

- Unemployment rate
- Inflation rate
- Interest rate
- Exchange rate

Indicator	Long Run	Short Run
Unemployment	- Called '**natural rate of unemployment**' - Depends on institutions & policies	- Generally related to the cycle in incomes - Relationship is called **Okun's Law**
Inflation	- Depends on institutions and policies - Often related to difference between growth in money supply and income (or output) growth; relationship is called the '**Quantity Theory of Money**' - Many central bank set an 'inflation target' for the medium- to long run	- Can be related to cycle in incomes - Relationship is called **Phillips Curve** - Phillips Curve has 'flattened' in recent years
Interest Rate	- Depends on balance between saving and investment - Distinction between 'nominal' and 'real' interest rates - Nominal interest rate = real interest rate + expected inflation (**Fisher equation**) - Called the neutral rate (r*)	- Can be influenced by actions of the central bank - Central banks set interest rate targets based on output gaps and inflation gaps (**Taylor Rule**) • Output gap = difference between output and trend • Inflation gap = difference between inflation and target
Exchange Rates	- Related to long-run difference in incomes (productivity) – the Balassa-Samuelson effect	- Related to movements in interest rates (**interest rate parity**)