Macroeconomics 1 - Week 1

Introduction to Macroeconomics
The data of Macroeconomics

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What is Economics about?

- The study of how best to allocate scarce resources among competing uses (trade-offs -> choices)

Core issues

- WHAT to produce with limited resources
- HOW to produce the goods and services we select
- FOR WHOM goods and services are produced

How to answer these questions?

What are the resources and uses?

- Land
- Labor
- Capital
- Entrepreneurship

Market mechanism:
The use of market prices to signal desired resource allocation
The Invisible Hand (Adam Smith)

Positive vs. Normative analysis

- **Positive statements**
  - Attempts to describe and analyze the reality
  - „minimum-wage laws cause unemployment“
- **Normative statements**
  - Based on subjective value system attempts to prescribe how the world should look like
  - „government should raise the minimum wage“
- Modern economics – positive science
  - Have to get rid of subjective value system

Macroeconomics and Microeconomics

Microeconomics

- Studies the behavior of individual consumers, firms, government agencies that compose the larger economy
- The study of how households and firms make decisions and how they interact in the markets

Macroeconomics

- Studies the behavior of the entire economy as a whole, economy-wide phenomena (inflation, unemployment, economic growth)
- Goal: understand and improve the performance of the economy as a whole

- Closely linked: the economy as a whole is just a collection of many household and many firms interacting in many markets

Macroeconomists address diverse questions

- Why is average income high in some countries while it is low in others?
- Why do prices rise rapidly in some periods of time while they are more stable in other periods?
- Why do production and employment expand in some years and contract in others?

The data of Macroeconomics

- Many types of data to measure the performance of economy
- Three macroeconomic variables are especially important:
  - Real GDP – total income of everyone in economy
  - Inflation rate – how fast prices are rising
  - Unemployment rate – the fraction of the labor force out of work
  - How are they determined? Why do they change over time? How do they interact?

National Accounting

National Accounting

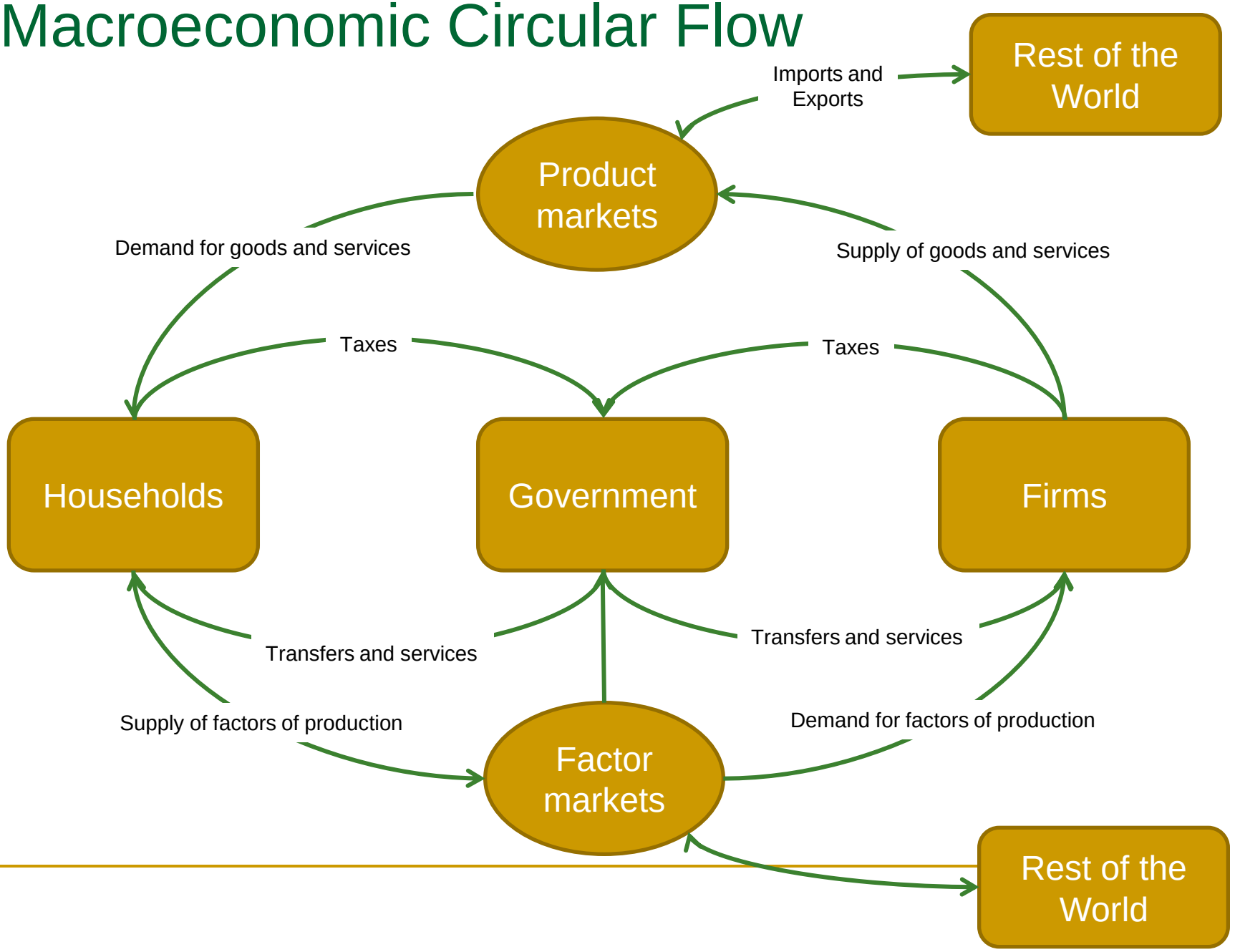
- When judging whether the economy is doing well or poorly, it is natural to look at the total income that everyone in the economy is earning.
- **Why?** – necessary for designing succesfull macroeconomic policies
- **National Accounting**: The measurement of aggregate economic activity usign complete and consistent accounting techniques

Measures of Output

Gross Domestic Product (GDP)

- Measures two things at once: the total income of everyone in the economy and the total expenditure on the economy's output of goods and services (*income must equal expenditure*)
- Most frequently used measure of aggregate output

Macroeconomic Circular Flow



Measures of Output

- Total ***market value*** of all ***final*** goods and services ***produced within a nation's borders*** in a ***given time*** period

- Market value
  - How to sum apples, cars, theatre performaces, teaching at school?
  - Throught Prices (each good and service produced and brought to a market has a price)
- Final goods
  - It records only the value of final goods, not intermediate goods (the value is counted only once – as the value of intermediate good is included in the value of final good)
  - Exception – intermediate good is not used but it is added to the firm's inventory
- Produced - Currently produced – used car
- Within a nation's boarders
- Given time – year or a quarter (seasonally adjusted)

GDP

- Why we count only final goods and services and omit intermediate?

	Farmer	Firm A1	Firm A2
Input	Labour + machinery	Labour + machinery + wheat	Labour + machinery + flour
Output	Wheat	Flour	Pasta
Output	$ 10 000	$ 30 000	$ 100 000
Intermediate consumption	0	$ 10 000	$ 30 000
Value added	$ 10 000	$ 20 000	$ 70 000s

- GDP is increased by 100 000 USD
- GDP = sum of final goods = sum of value added

Measures of Output

- What Is Not Counted in GDP?
  - GDP excludes most items that are produced and consumed at home and that never enter the marketplace.
  - It excludes items produced and sold illicitly, such as illegal drugs.

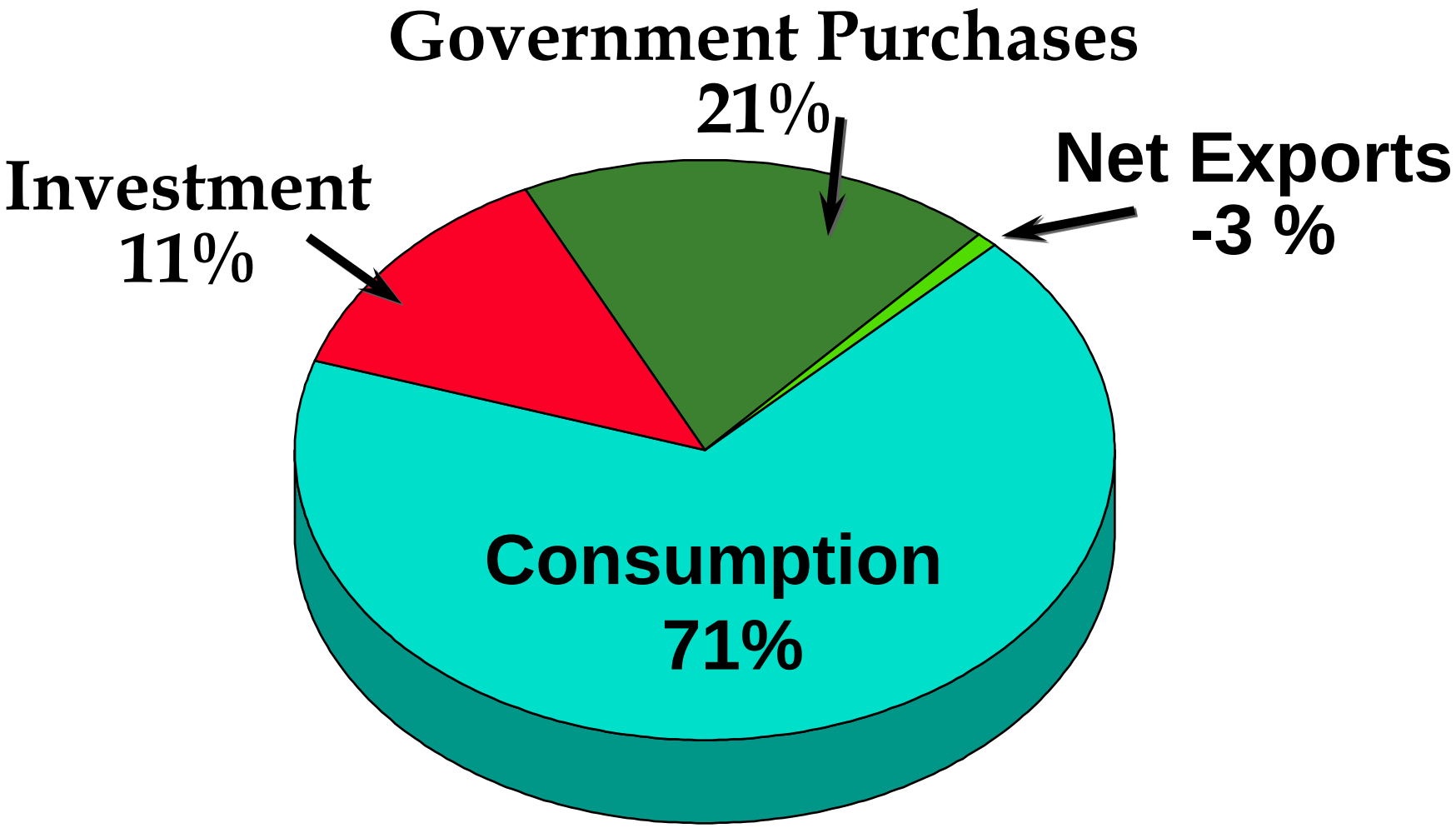
- Domestic – refers to production within borders - alternative accounting for ownership of factors of production is Gross National Income (Product)
- Gross – depreciation of fixed capital (wearing out of plant and equipment) not deducted yet, after deduction -> Net Domestic product

- GDP (*Y*) is the sum of the following:

$$Y = C + I + G + NX$$

  - Consumption *(C)*
    - The spending by households on goods and services, with the exception of purchases of new housing.
  - Investment *(I)*
    - The spending on capital equipment, inventories, and structures, including new housing.
  - Government Purchases *(G)*
    - The spending on goods and services by local, state, and federal governments.
    - Does *not* include transfer payments because they are not made in exchange for currently produced goods or services (social security benefits).
  - Net Exports *(NX)* – *exports minus imports*

U.S. GDP and Its Components (2009)



Real vs. Nominal GDP

- Nominal GDP values the production of goods and services at current prices.

- Real GDP values the production of goods and services at constant prices (i.e. reflect only changes in the amounts being produced).
  - Adjustment using constant prices of a base period
  - Chain-weighted price adjustment

- GDP deflator = (Nominal GDP / Real GDP)*100
  - Reflects only the prices of goods and services
  - Take inflation out of nominal GDP

Constant Prices (of a base period)

$$Nominal\ GDP = quantities_{current\ period} \times prices_{current\ period}$$

$$Real\ GDP\ in\ prices\ of\ base\ period = quantities_{current\ period} \times prices_{base\ period}$$

$$Real\ GDP\ in\ prices\ of\ base\ period = \frac{Nominal\ GDP}{Price\ level\ in\ current\ period} \times price\ level\ in\ base\ period$$

Real vs. Nominal GDP

Average annual % GDP growth, 1980-2003

Current prices

Netherlands	+4.6
Mexico	+37.1
Turkey	+62.3

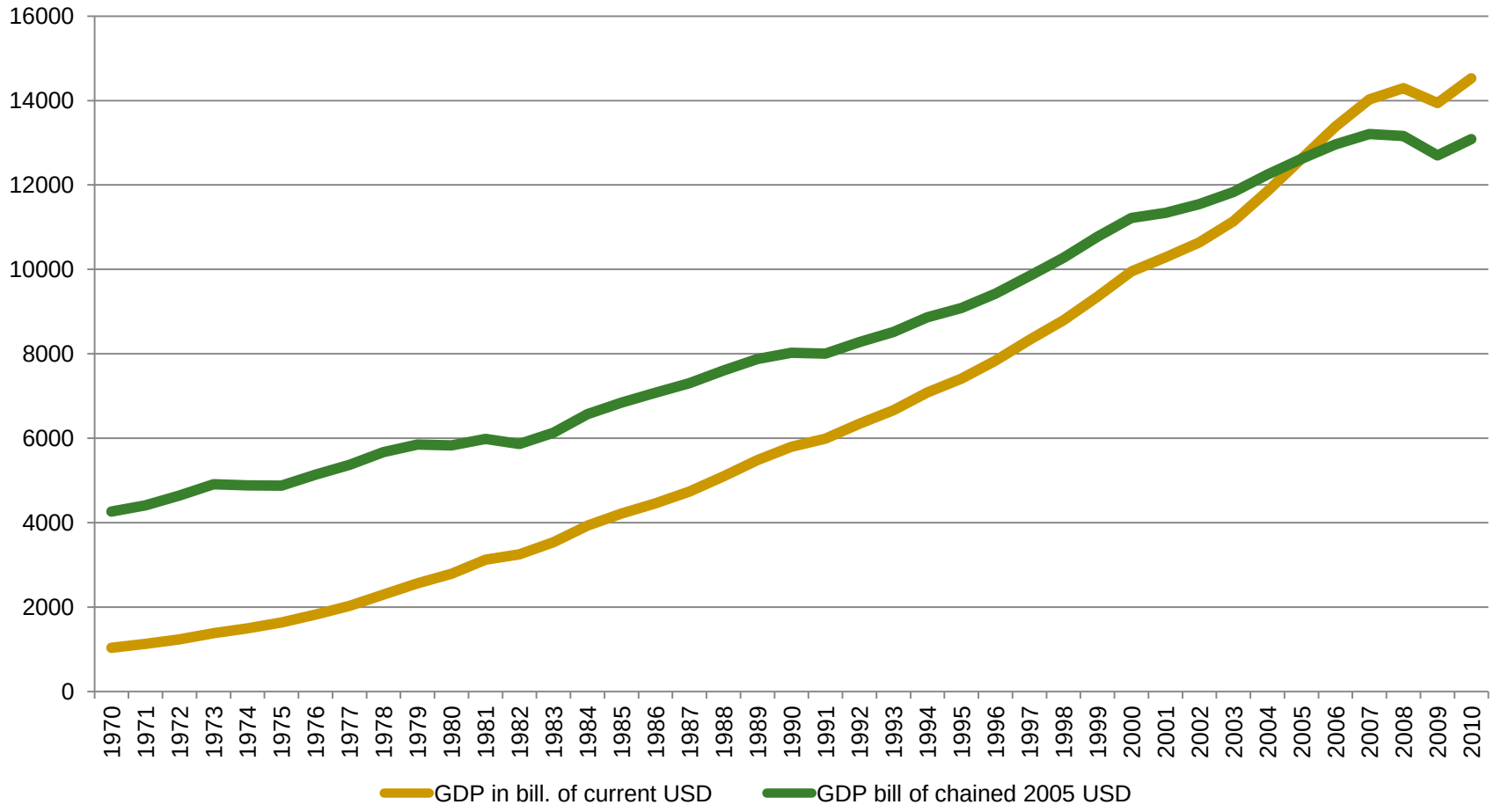
Table 1. **GDP, volume and price indices**

Average annual growth in percentage, 1980-2003

	Volume	Prices
Netherlands	+2.3	+2.3
Mexico	+2.4	+33.9
Turkey	+4.1	+60.0

Source: OECD (2006), *National Accounts of OECD Countries, Volume I, Main Aggregates, 1993-2004, 2006 Edition*, OECD, Paris.

US Real and Nominal GDP



Advanced: Problem with constant prices

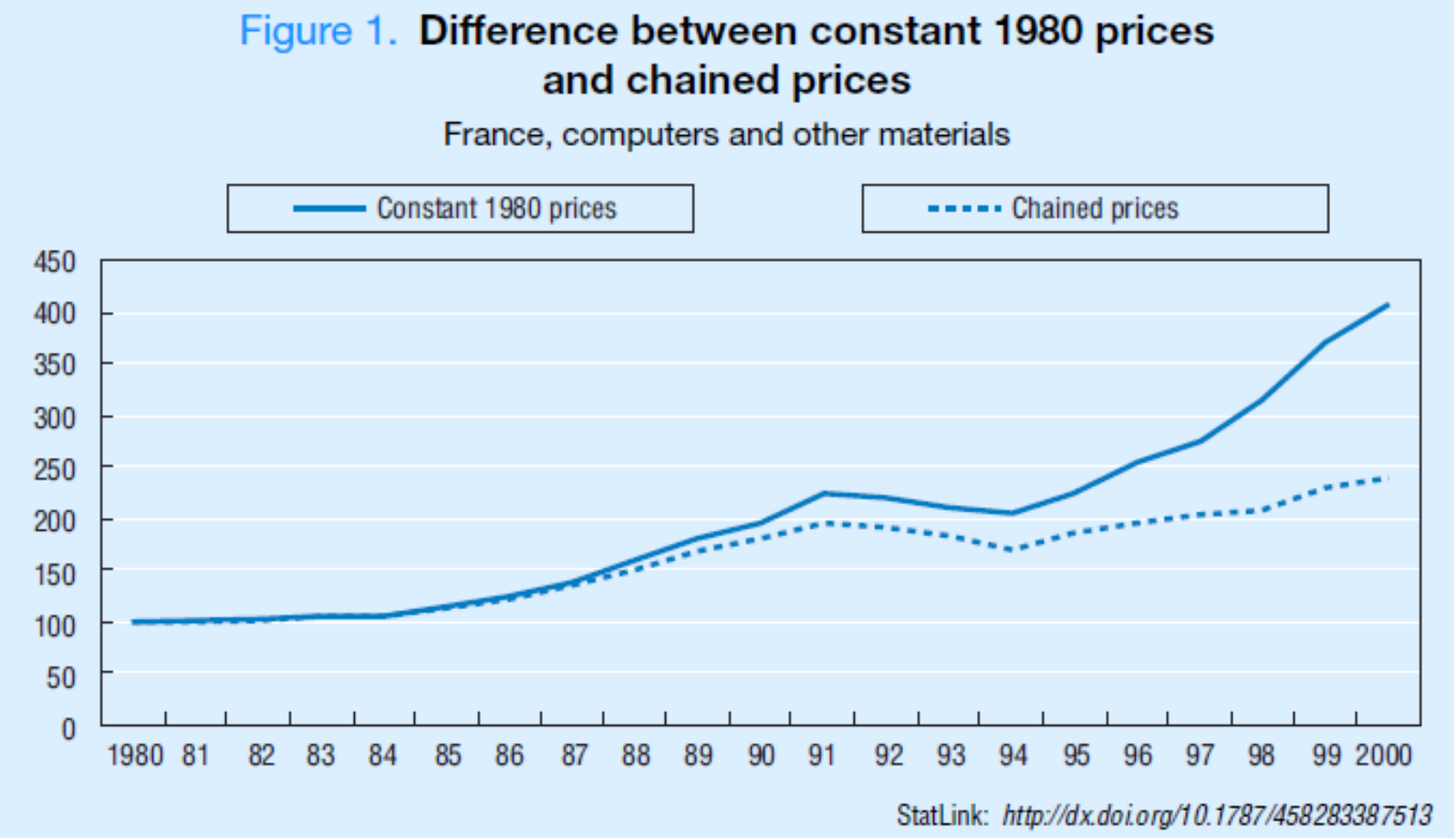
- We are fixing relative prices. The further from the base year the less they correspond to reality.

Typical example computers:

Year T: 1000 computers of type X, price P_X and quality V_X
Year T+1: 1000 computers of type Y, price P_Y and quality V_Y
Estimate $P_Y(T)=1.2*P_X(T)$ and suppose $P_Y(T+1)=P_X(T)$

$$\text{Volume of computers (b.y.T)} = \frac{1000 \times P_Y(\text{T+1})}{P_Y(T+1)} \times P_Y(T) = 1200$$

Advanced: Problem with constant prices



Advanced:Chain-Weighted Price Adjustment

- Chain-weighted indices use moving average of price levels in consecutive years as an inflation adjustment
- One method is e.g. to use price levels and structure of previous period to find the volume index then chain those to a reference year
- Most real national accounts are obtained using this method nowadays

Three approaches to measuring GDP

1. **Output approach:** GDP= sum of gross value added
2. **Expenditure approach:** GDP=sum of final demand aggregates ~ demand side
3. **Income approach:** GDP=wages+profits+interest+rent (distributed to owners of factors of production) ~ supply side

Three approaches to measuring GDP

Germany, billion euros			
Codes[1]		1991	2004
GDP	Gross domestic product (output approach)	1 502.2	2 177.0
B1B	Value added at base-year prices	1 359.5	1 965.1
D21	+ taxes net of subsidies on the products	142.7	211.9
GDP	Gross domestic product (demand approach)	1 502.2	2 177.0
P3	Final consumption expenditure	1 140.9	1 677.5
P5	+ Gross capital formation	364.9	385.5
P6	+ Exports of goods and services	395.2	834.8
P7	– Imports of goods and services	398.7	720.8
GDP	Gross domestic product (income approach)	1 502.2	2 177.0
D1	Compensation of employees	844.0	1 133.1
B2 + B3	+ Gross operating surplus and gross mixed income	515.1	811.9
D2	+ Taxes net of subsidies on production and imports	143.1	232.1

1. These are the official SNA codes

Source: OECD (2006), *National Accounts of OECD Countries: Volume I, Main Aggregates*, 1993-2004, 2006 Edition, OECD, Paris.

StatLink: *http://dx.doi.org/10.1787/400886162203*

Different measures of income

$$\textbf{Gross National Income}(GNI)$$
$$= GDP + primary\ income\ receivable\ from\ RoW$$
$$- primary\ income\ payable\ to\ RoW$$

$$Net\ National\ Income$$
$$= GNI - depreciation\ (consumption\ of\ fixed\ capital)$$

$$Net\ National\ Disposable\ Income$$
$$= NNI + current\ transfers\ from\ RoW$$
$$- current\ transfers\ to\ RoW$$
$$= net\ savings + consumption$$

$$Savings\ - Investment = Net\ Lending/Borrowing$$

Different measures of income

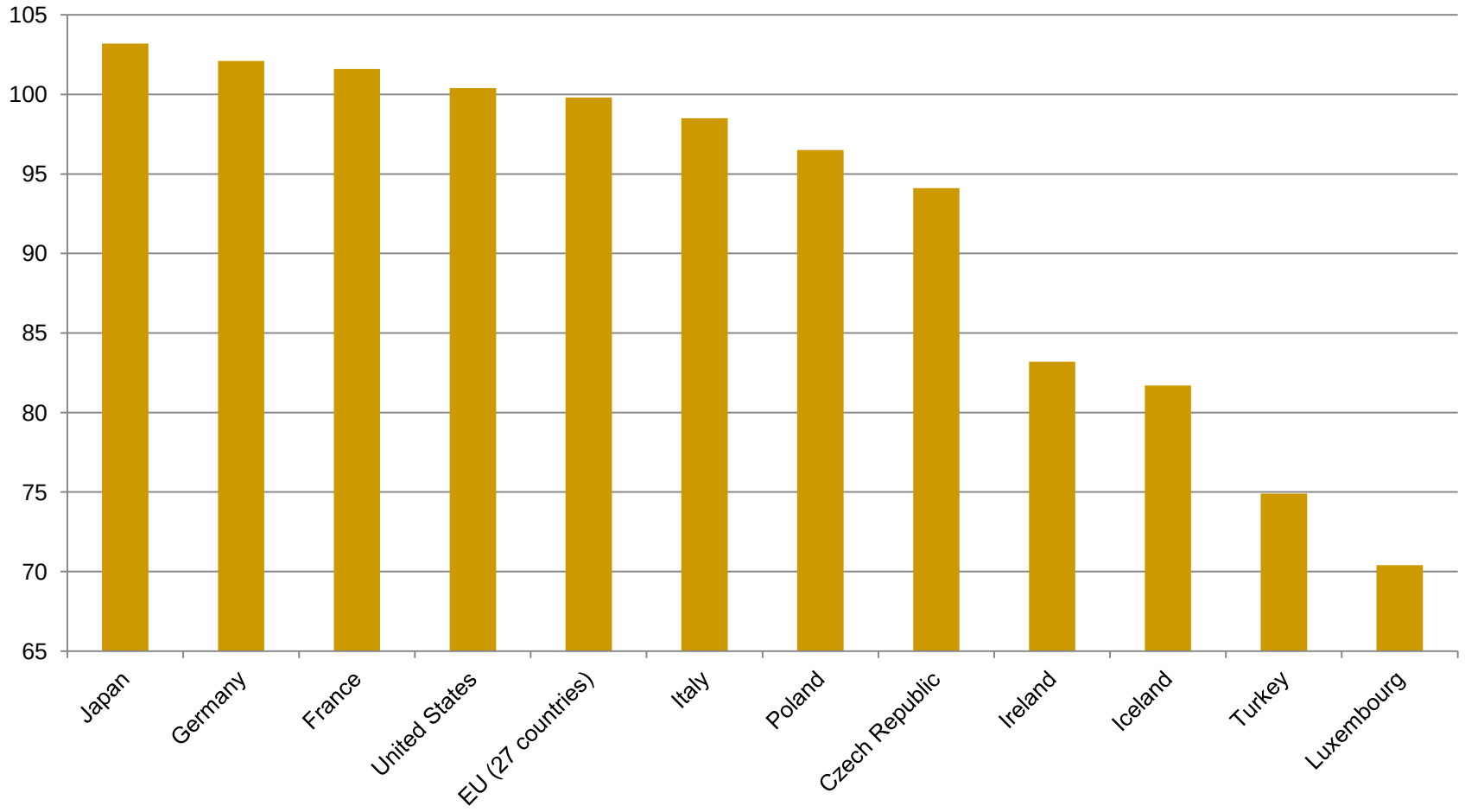
Table 8. **Korea: the transition from GDP to GNI and other major aggregates**

Billions of Won, 2003, at current prices

B1_G.	**Gross domestic product**	**724 675.00**
D1_D4.	+ Primary incomes receivable from the rest of the world	9 116.70
D1_D4.	– Primary incomes payable to the rest of the world	–8 371.40
B5_G.	**Gross national income at market prices**	**725 420.30**
K1.	– Consumption of fixed capital	–98 850.60
B5_N.	**Net national income at market prices**	**626 569.70**
D5_D7.	+ Current transfers receivable from the rest of the world	9 375.90
D5_D7.	– Current transfers payable to the rest of the world	–12 819.40
B6_N.	**Net national disposable income**	**623 126.20**
P3.	–Final consumption expenditures	–485 380.40
B8_N.	**Saving, net**	**137 745.80**
D9.	+ Net capital transfers from the rest of the world	–1 601.10
P5.	– Gross capital formation	–217 099.00
K2.	– Acquisitions less disposals of non-produced assets	–66.40
K1.	+ Consumption of fixed capital	98 850.60
B9_S1.	**Net lending/net borrowing**	**17 829.90**

StatLink: *http://dx.doi.org/10.1787/671625385132*

Gross national Income as % of GDP (2009)



Source: Eurostat

Limitations of GDP

Example: US between 1990 and 2009

- GDP growth of 58.2%
- GDP per capita grew by 28.2%
- Mean household income grew by 14.2%[1]
- Median household income grew by 4.5%

1) It might be correctly striking to you that the mean (average) household income grew slower than (average) GDP per capita since you know that all income in the economy should be equal to GDP. Here the difference is due to statistical imprecisions - the mean household income comes from Census data where e.g. the highest category of incomes is reported as e.g. 250 000 plus, so it is less precise…so census data capture only a part of the increase in the income inequality…see http://krugman.blogs.nytimes.com/2011/02/03/economic-growth-and-household-income/ .. So economically more important is the comparison between mean and median income and between GDP and GDP per capita…

GDP and economic well-being

- GDP is the best single measure of the economic well-being of a society.
- GDP per person tells us the income and expenditure of the average person in the economy.
- Higher GDP per person indicates a higher standard of living.
- GDP is not a perfect measure of the happiness or quality of life, however.
- Some things that contribute to well-being are not included in GDP.
  - The value of leisure.
  - The value of a clean environment.
  - The value of almost all activity that takes place outside of markets, such as the value of the time parents spend with their children and the value of volunteer work.

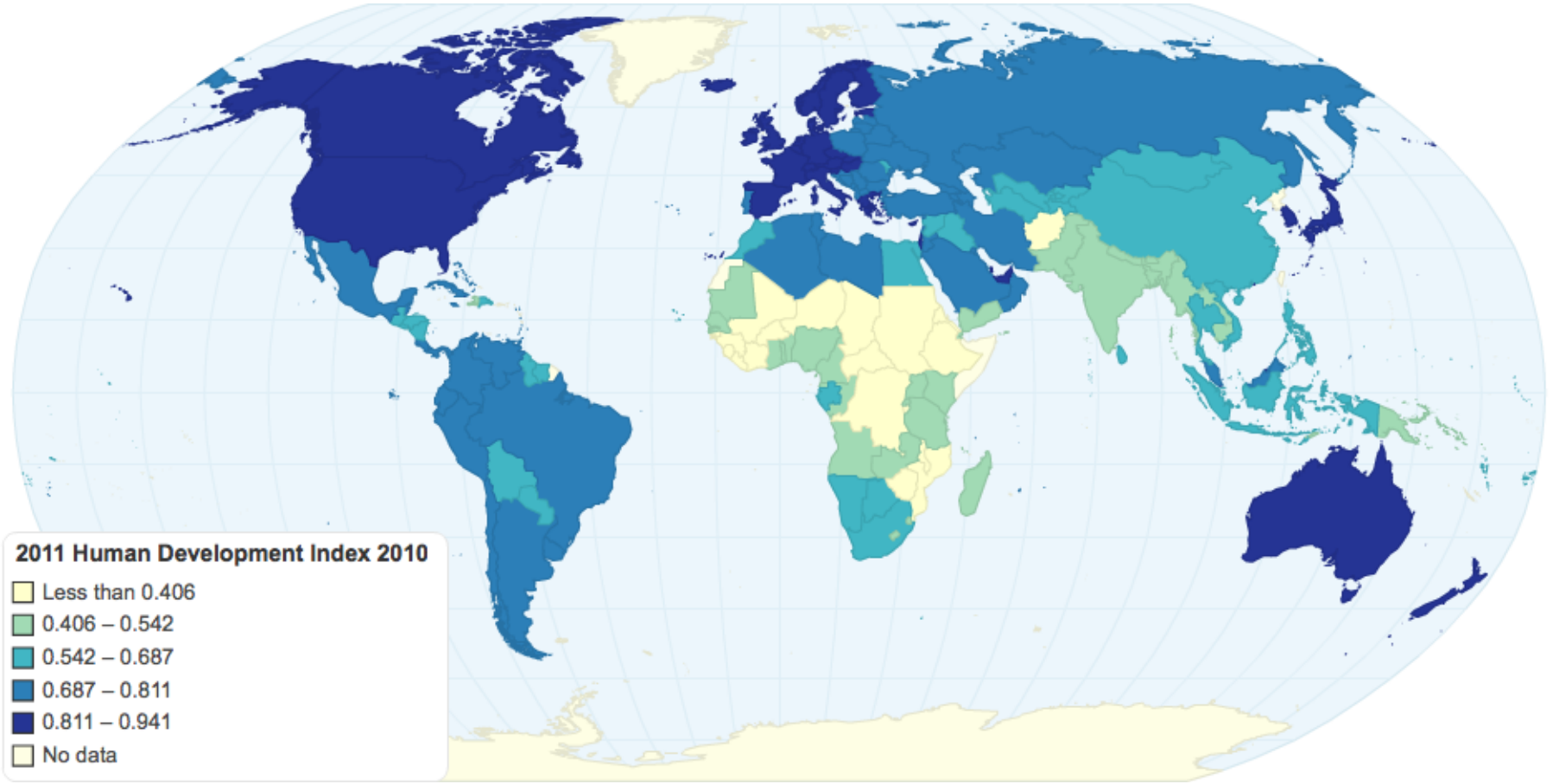
Alternative measures

- UN Human Development Index
  - comparative measure of life expectancy, literacy, education and standards of living
  - http://hdr.undp.org/en/statistics/
- OECD Better Life Index
  - http://www.oecdbetterlifeindex.org/
  - Can construct your own index

GDP, Life Expectancy, and Literacy

Country	Real GDP per Person (1999)	Life Expectancy	Adult Literacy
United States	$31,872	77 years	99%
Japan	24,898	81	99
Germany	23,742	78	99
Mexico	8,297	72	91
Russia	7,473	66	99
Brazil	7,037	67	85
China	3,617	70	83
Indonesia	2,857	66	86
India	2,248	63	56
Pakistan	1,834	60	45
Bangladesh	1,483	59	41
Nigeria	853	52	63

Human Development Index



GDP and Happiness

- Is it GDP we should try to maximize?
- Can we measure happiness? Yes
- Standard thinking:

  ↑ GDP → ↑ Income → ↑ Consumption → ↑ Happiness
- Easterlin Paradox:
  - In international comparisons average reported happiness does not vary much with income per person especially when income is sufficient to cover basic needs
  - In U.S. between 1946-70 great growth in GDP but no trend in reported happiness
  - Does income after some level influence the level of happiness

Summary

- Because every transaction has a buyer and a seller, the total expenditure in the economy must equal the total income in the economy.
- Gross Domestic Product (GDP) measures an economy's total expenditure on newly produced goods and services and the total income earned from the production of these goods and services.

Summary

- GDP is the market value of all final goods and services produced within a country in a given period of time.
- GDP is divided among four components of expenditure: consumption, investment, government purchases, and net exports.

Summary

- Nominal GDP uses current prices to value the economy's production. Real GDP uses constant base-year prices to value the economy's production of goods and services.
- The GDP deflator—calculated from the ratio of nominal to real GDP—measures the level of prices in the economy.

Summary

- GDP is a good measure of economic well-being because people prefer higher to lower incomes.
- It is not a perfect measure of well-being because some things, such as leisure time and a clean environment, aren't measured by GDP.

The measurement of CPI

The consumer price index (CPI)

- The *consumer price index (CPI)* is a measure of the overall cost of the goods and services bought by a typical consumer
- The Bureau of Labor Statistics reports the CPI each month.
- It is used to monitor changes in the cost of living over time.
- When the CPI rises, the typical family has to spend more dollars to maintain the same standard of living.

How the CPI is calculated

- ***Fix the Basket:*** Determine what prices are most important to the typical consumer.
  - The Bureau of Labor Statistics (BLS) identifies a market basket of goods and services the typical consumer buys.
  - The BLS conducts monthly consumer surveys to set the weights for the prices of those goods and services.
- ***Find the Prices:*** Find the prices of each of the goods and services in the basket for each point in time.
- ***Compute the Basket's Cost:*** Use the data on prices to calculate the cost of the basket of goods and services at different times.

How the CPI is calculated

- ***Choose a Base Year and Compute the Index:***
  - Designate one year as the base year, making it the benchmark against which other years are compared.
  - Compute the index by dividing the price of the basket in one year by the price in the base year and multiplying by 100.

$$CPI = (\text{Price of basket}_{x} / \text{Price of basket}_{base}) * 100$$

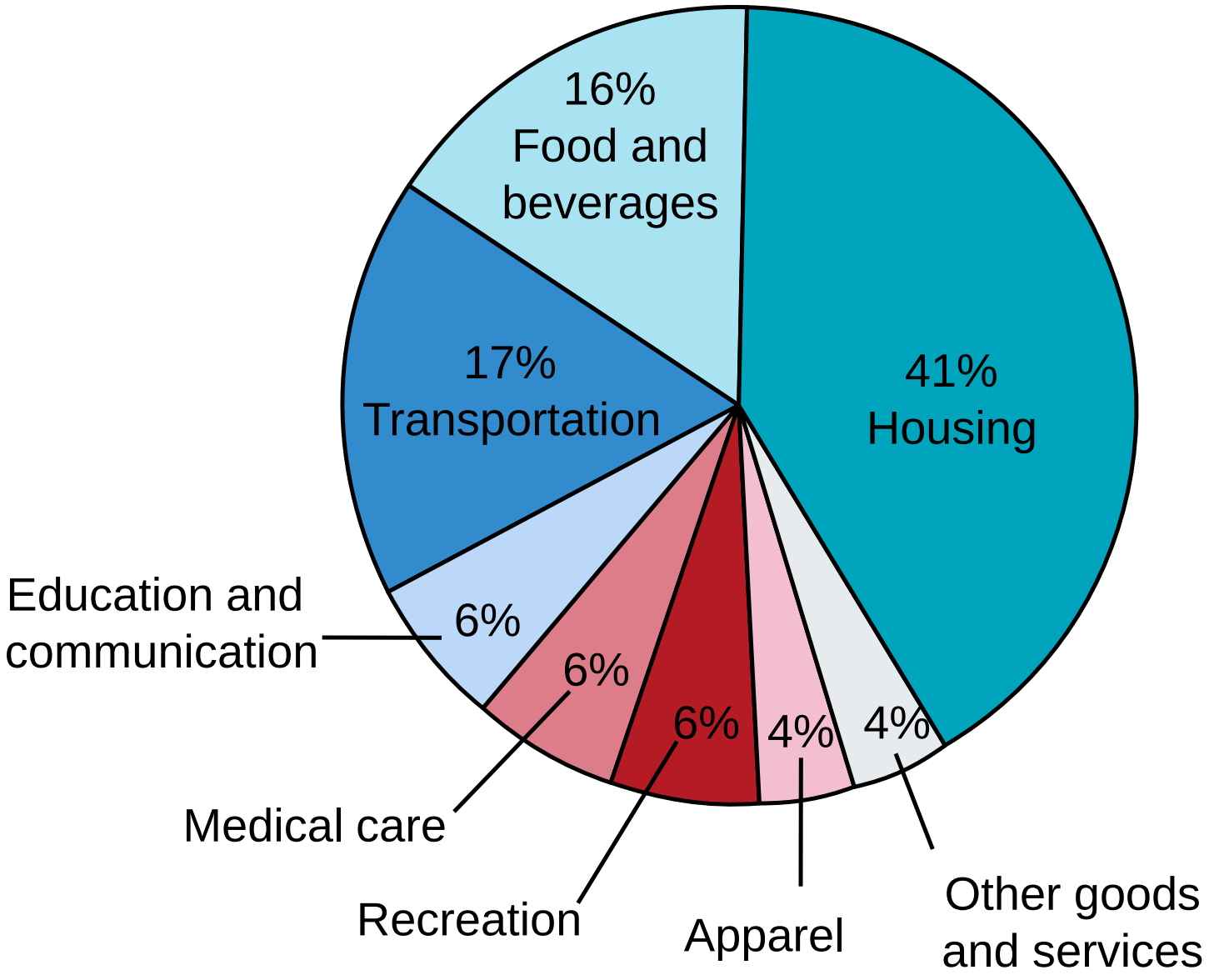
- ***Compute the inflation rate***

Inflation

- Inflation refers to a situation in which the economy's overall price level is rising.
- The inflation rate is the percentage change in the price level from the previous period.
- The Inflation Rate
  - The *inflation rate* is calculated as follows:

$$\text{Inflation Rate in Year 2} = \frac{\text{CPI in Year 2} - \text{CPI in Year 1}}{\text{CPI in Year 1}} \times 100$$

What's in the CPI's Basket?



Problems in Measuring the Cost of Living

- The substitution bias, introduction of new goods, and unmeasured quality changes cause the CPI to overstate the true cost of living.
  - The issue is important because many government programs use the CPI to adjust for changes in the overall level of prices.
  - The CPI overstates inflation by about 1 percentage point per year.

The GDP Deflator versus the Consumer Price Index

- The GDP deflator is calculated as follows:

$$\text{GDP deflator} = \frac{\text{Nominal GDP}}{\text{Real GDP}} \times 100$$

The GDP Deflator versus the Consumer Price Index

- Economists and policymakers monitor both the GDP deflator and the consumer price index to measure how quickly prices are rising.

- There are two important differences between the indexes that can cause them to diverge.

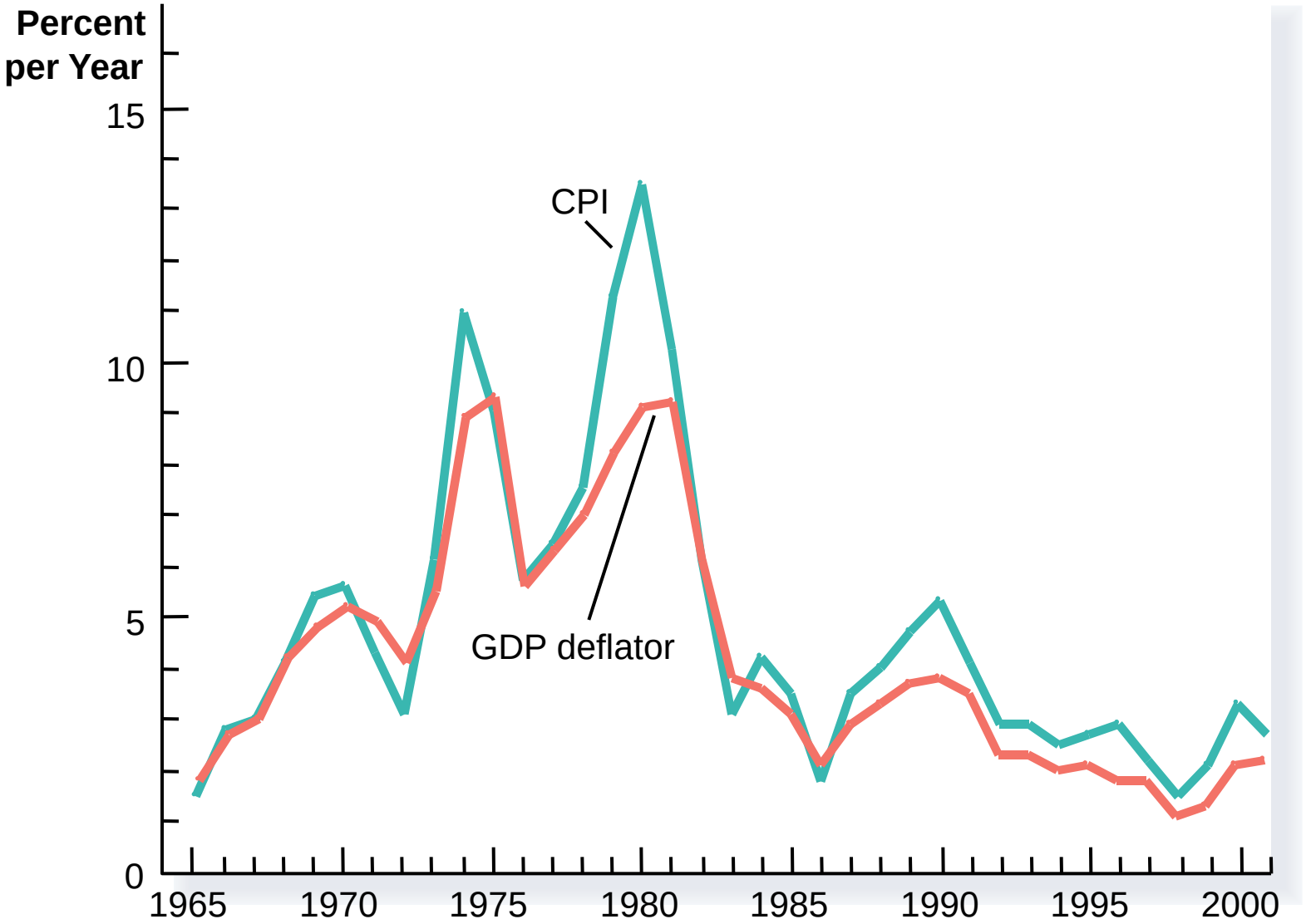
The GDP Deflator versus the Consumer Price Index

- The *GDP deflator* reflects the prices of all goods and services *produced domestically*, whereas...
- …the *consumer price index* reflects the prices of all goods and services *bought by consumers*.

The GDP Deflator versus the Consumer Price Index

- The *consumer price index* compares the price of a *fixed basket* of goods and services to the price of the basket in the base year (only occasionally does the BLS change the basket)...
- …whereas the *GDP deflator* compares the price of *currently produced* goods and services to the price of the same goods and services in the base year.

Two Measures of Inflation



Summary

- The consumer price index shows the cost of a basket of goods and services relative to the cost of the same basket in the base year.
- The index is used to measure the overall level of prices in the economy.
- The percentage change in the CPI measures the inflation rate.

Summary

- The consumer price index is an imperfect measure of the cost of living for the following three reasons: substitution bias, the introduction of new goods, and unmeasured changes in quality.
- Because of measurement problems, the CPI overstates annual inflation by about 1 percentage point.

Summary

- The GDP deflator differs from the CPI because it includes goods and services produced rather than goods and services consumed.
- In addition, the CPI uses a fixed basket of goods, while the GDP deflator automatically changes the group of goods and services over time as the composition of GDP changes.