

# Lecture 1: Gross Domestic Product

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# Structure of the Course

- **First Part of the Class:**
  - The macroeconomy in the long run
  - Why are countries rich and poor?
  - What can government policy do about it?
- **Second Part of the Class:**
  - The macroeconomy in the short run
  - What are “business cycles”?
  - How should governments react to them?

# Rich and Poor

- Spend the next several lectures looking at the variation in income (production) across time and across countries
- Our study will be based on economic observables rather than, for instance, culture
- Particular question: what government/institutional policies might help/harm development?
- But first, we need to be able to know how we're measuring income, and how to make it comparable across time/countries

# Income and Expenditure

- **Gross Domestic Product (GDP)** measures total income of everyone in the economy.
- GDP also measures total expenditure on the economy's output of goods & services.

*For the economy as a whole,  
**income equals expenditure**  
because every dollar a buyer spends  
is a dollar of income for the seller.*

# Gross Domestic Product (GDP) Is...

...the **market value** of all final goods & services produced within a country in a given period of time.

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*Goods are valued at their market prices, so:*

- *All goods measured in the same units (e.g., dollars in the U.S.)*
- *Things that don't have a market value are excluded.*

# Gross Domestic Product (GDP) Is...

...the market value of all **final** goods & services produced within a country in a given period of time.

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***Final goods:** intended for the end user*

***Intermediate goods:** used as components or ingredients in the production of other goods*

*GDP only includes final goods – they already embody the value of the intermediate goods used in their production.*

# Gross Domestic Product (GDP) Is...

...the market value of all final goods & services produced within a country in a given period of time.

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*GDP includes tangible goods  
(beer, wine, brats, ketchup...)*

*and intangible services  
(dry cleaning, concerts, cell phone service).*

# Gross Domestic Product (GDP) Is...

...the market value of all final goods & services produced within a country in a given period of time.

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*GDP includes currently produced goods, not goods produced in the past.*



# Gross Domestic Product (GDP) Is...

...the market value of all final goods & services produced within a country in a given period of time.

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*GDP measures the value of production that occurs within a country's borders, whether done by its own citizens or by foreigners located there.*

# Gross Domestic Product (GDP) Is...

...the market value of all final goods & services produced within a country  
in a given period of time.

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*Usually a year or a quarter (3 months)*

# The Components of GDP

- Recall: GDP is total spending.
- Total spending is classified into four components:
  - Consumption (**C**)
  - Investment (**I**)
  - Government Purchases (**G**)
  - Net Exports (**NX**)
- These components add up to GDP (denoted **Y**):

$$\mathbf{Y = C + I + G + NX}$$

# Consumption (C)

- is total spending by households on goods & services.
- Note on housing costs:
  - For renters, consumption includes rent payments.
  - For homeowners, consumption includes the imputed rental value of the house, but not the purchase price or mortgage payments.

# Investment (I)

- is total spending on goods that will be used in the future to produce more goods.
- includes spending on
  - capital equipment (e.g., machines, tools)
  - structures (factories, office buildings, houses)
  - inventories (goods produced but not yet sold)

*Note: “**Investment**” does not mean the purchase of financial assets like stocks and bonds.*

# Government Purchases (G)

- is all spending on the goods & services purchased by government at the federal, state, and local levels.
- **G** excludes **transfer payments**, such as Social Security or unemployment insurance benefits.  
They are not purchases of goods & services.

# Net Exports (NX)

- **NX** = exports – imports
- Exports represent foreign spending on the economy's goods & services.
- Imports are the portions of **C**, **I**, and **G** that are spent on goods & services produced abroad.
- Adding up all the components of GDP gives:

$$\mathbf{Y = C + I + G + NX}$$

# U.S. GDP and Its Components, 2011

|           | <i>billions</i> | <i>% of GDP</i> | <i>per capita</i> |
|-----------|-----------------|-----------------|-------------------|
| <b>Y</b>  | \$14,991        | 100.0           | \$47,881          |
| <b>C</b>  | 10,729          | 71.6            | 34,283            |
| <b>I</b>  | 2,236           | 14.9            | 7,134             |
| <b>G</b>  | 2,594           | 17.3            | 8,283             |
| <b>NX</b> | −568            | −3.8            | −1,819            |



# France GDP and Its Components, 2011

|           | <i>billions</i> | <i>% of GDP</i> | <i>per capita</i> |
|-----------|-----------------|-----------------|-------------------|
| <b>Y</b>  | \$2,306         | 100.0           | \$36,538          |
| <b>C</b>  | 1,330           | 57.7            | 21,082            |
| <b>I</b>  | 476             | 20.6            | 7,527             |
| <b>G</b>  | 565             | 24.5            | 8,952             |
| <b>NX</b> | −65             | −2.8            | −1,023            |

# China GDP and Its Components, 2011

|           | <i>billions</i> | <i>% of GDP</i> | <i>per capita</i> |
|-----------|-----------------|-----------------|-------------------|
| <b>Y</b>  | \$11,167        | 100.0           | \$8,290           |
| <b>C</b>  | 3,902           | 34.9            | 2,893             |
| <b>I</b>  | 5,490           | 49.2            | 4,079             |
| <b>G</b>  | 1,484           | 13.3            | 1,102             |
| <b>NX</b> | 291             | 2.6             | 215               |

# Digression: Other Measures of Income

- GNP (Gross National Product): total income earned by a country's **permanent** residents.
- NNP (Net National Product):  
= GNP – depreciation (consumption of fixed capital)
- National Income:  
= NNP – indirect business taxes + business subsidies

# Real versus Nominal GDP

- Inflation can distort economic variables like GDP, so we have two versions of GDP:  
One is corrected for inflation, the other is not.
- **Nominal GDP** values output using current prices. It is not corrected for inflation.
- **Real GDP** values output using the prices of a *base year*. Real GDP is corrected for inflation.

# The GDP Deflator

- The GDP deflator is a measure of the overall level of prices.
- Definition:

$$\text{GDP deflator} = 100 \times \frac{\text{nominal GDP}}{\text{real GDP}}$$

- One way to measure the economy's **inflation rate** is to compute the percentage increase in the GDP deflator from one year to the next.

# ACTIVE LEARNING 1

## Computing GDP

|        | 2007 (base yr) |     | 2008  |       | 2009  |      |
|--------|----------------|-----|-------|-------|-------|------|
|        | $P$            | $Q$ | $P$   | $Q$   | $P$   | $Q$  |
| Good A | \$30           | 900 | \$31  | 1,000 | \$36  | 1050 |
| Good B | \$100          | 192 | \$102 | 200   | \$100 | 205  |

Use the above data to solve these problems:

- A. Compute nominal GDP in 2007.
- B. Compute real GDP in 2008.
- C. Compute the GDP deflator in 2009.

# ACTIVE LEARNING **1**

## Answers

|        | 2007 (base yr) |          | 2008     |          | 2009     |          |
|--------|----------------|----------|----------|----------|----------|----------|
|        | <i>P</i>       | <i>Q</i> | <i>P</i> | <i>Q</i> | <i>P</i> | <i>Q</i> |
| Good A | \$30           | 900      | \$31     | 1,000    | \$36     | 1050     |
| Good B | \$100          | 192      | \$102    | 200      | \$100    | 205      |

**A.** Compute nominal GDP in 2007.

$$\text{\$30} \times 900 + \text{\$100} \times 192 = \underline{\text{\$46,200}}$$

**B.** Compute real GDP in 2008.

$$\text{\$30} \times 1000 + \text{\$100} \times 200 = \underline{\text{\$50,000}}$$

# ACTIVE LEARNING **1**

## Answers

|        | 2007 (base yr) |          | 2008     |          | 2009     |          |
|--------|----------------|----------|----------|----------|----------|----------|
|        | <i>P</i>       | <i>Q</i> | <i>P</i> | <i>Q</i> | <i>P</i> | <i>Q</i> |
| Good A | \$30           | 900      | \$31     | 1,000    | \$36     | 1050     |
| Good B | \$100          | 192      | \$102    | 200      | \$100    | 205      |

**C.** Compute the GDP deflator in 2009.

$$\text{Nom GDP} = \$36 \times 1050 + \$100 \times 205 = \underline{\$58,300}$$

$$\text{Real GDP} = \$30 \times 1050 + \$100 \times 205 = \underline{\$52,000}$$

$$\begin{aligned}\text{GDP deflator} &= 100 \times (\text{Nom GDP})/(\text{Real GDP}) \\ &= 100 \times (\$58,300)/(\$52,000) = \underline{112.1}\end{aligned}$$



# GDP and Economic Well-Being

- *Real GDP per capita is the main indicator of the average person's standard of living.*
- But GDP is not a great measure of well-being.

# GDP Does Not Value:

- the quality of the environment
- leisure time
- non-market activity, such as the child care a parent provides his or her child at home
- an equitable distribution of income

# GDP Maximization Strategies:

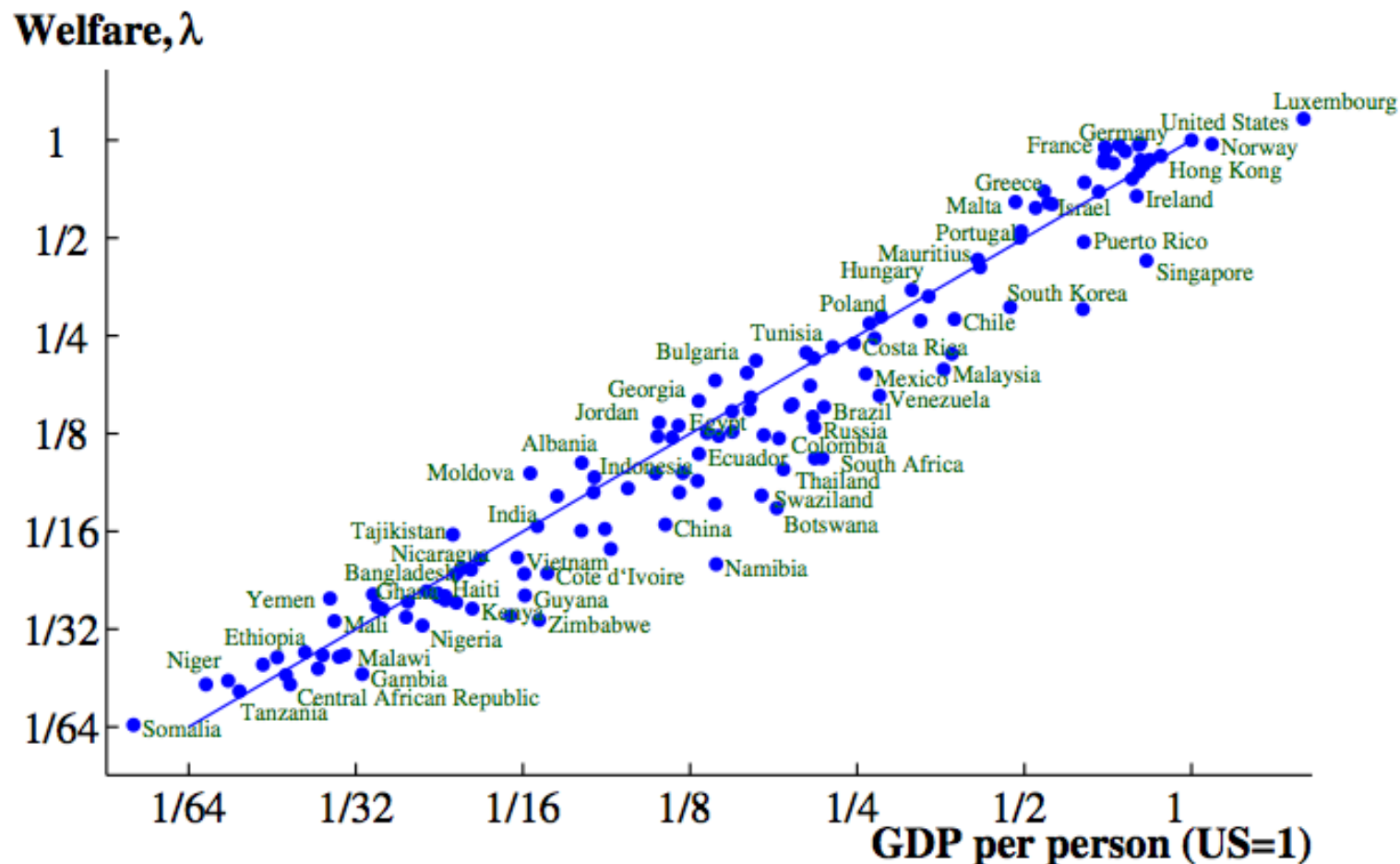
- Require everyone to work 100 hours per week
- Allow for (or encourage) child labor
- Minimize consumption to maximize investment
- Run perpetual trade surpluses (produce lots of stuff, and send it abroad for nothing in exchange)

*Clearly these outcomes are not good!*

# GDP and Welfare

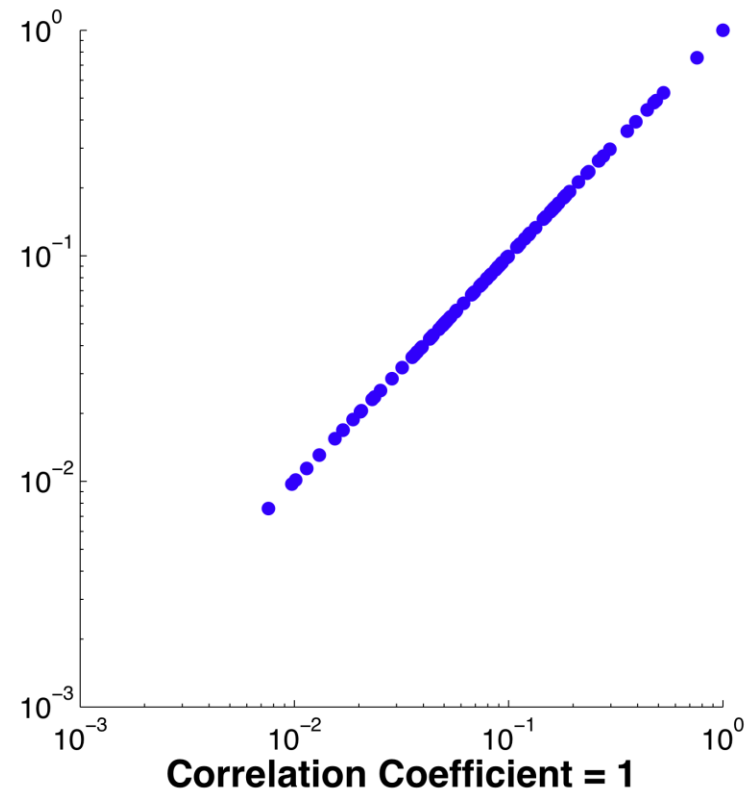
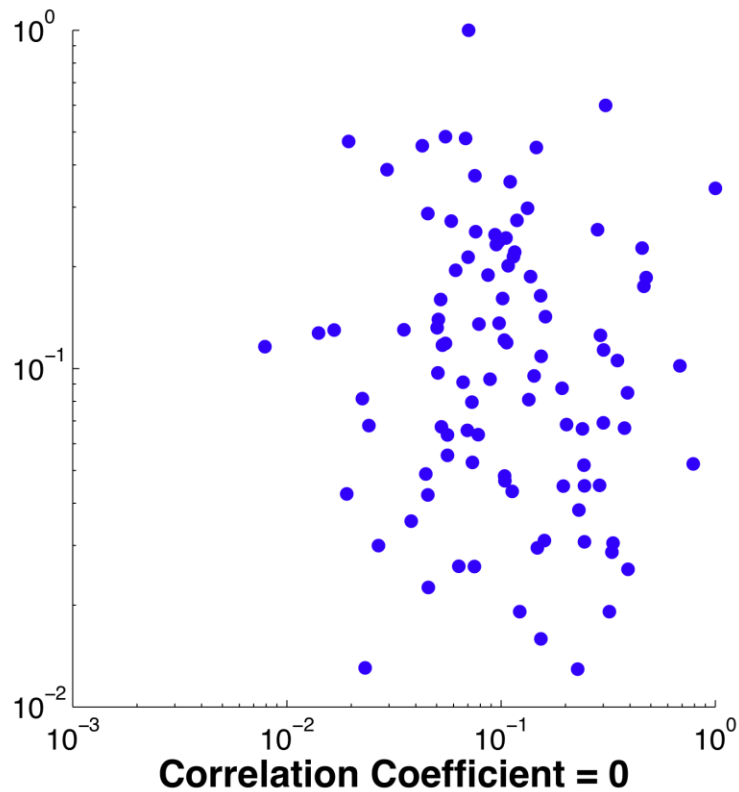
- Pete Klenow and Chad Jones (both from Stanford University) measure **welfare** across countries in a recent paper (2011). They take into account:
  - Life expectancy at birth
  - Consumption of goods & services (instead of income)
  - Leisure
  - Income inequality

# GDP and Welfare

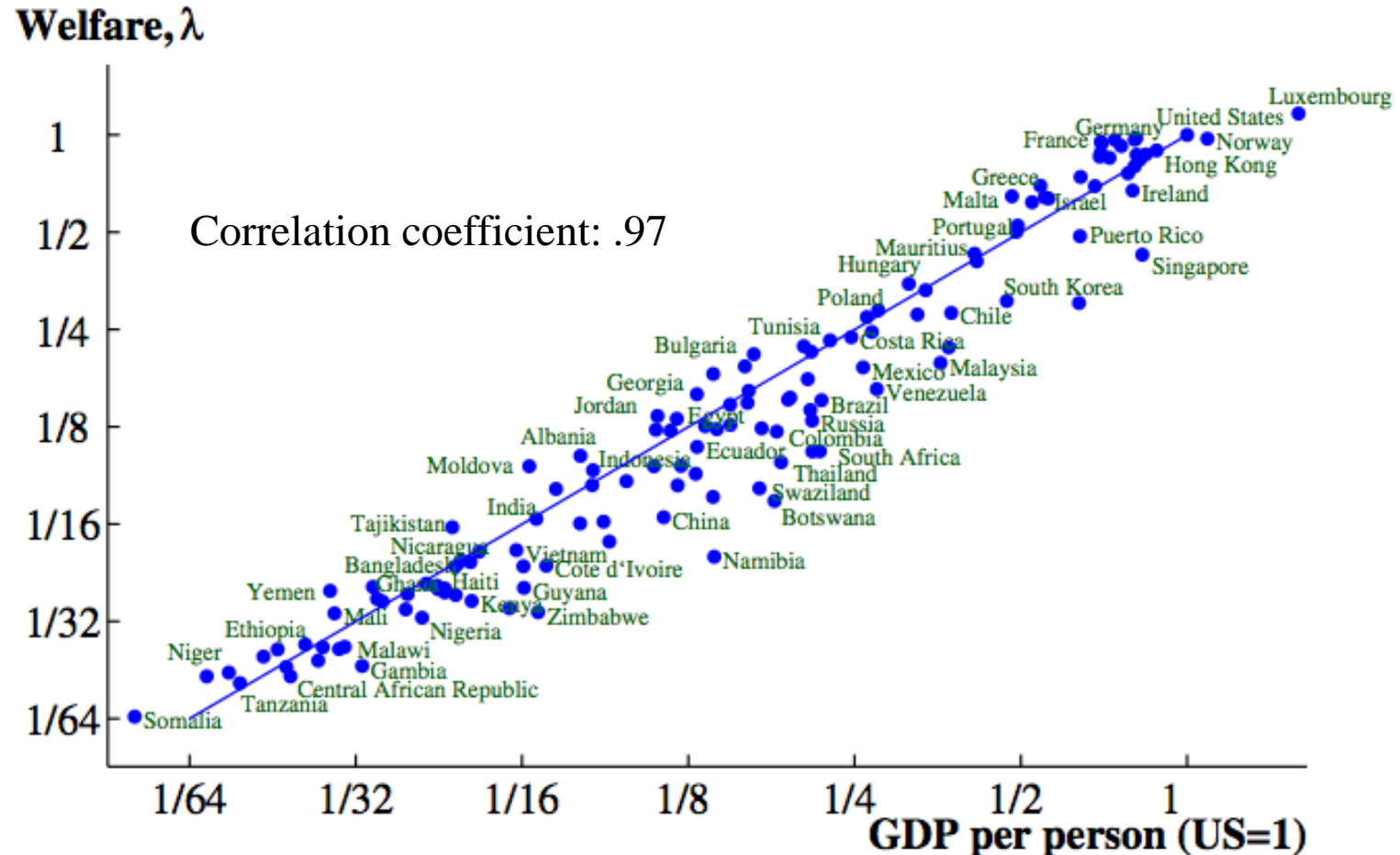


Jones & Klenow (2010), Figure 3, p. 17:  
Welfare and Income across Countries, 2000

# GDP and Welfare: Digression on Correlations



# GDP and Welfare



Jones & Klenow (2010), Figure 3, p. 17:  
Welfare and Income across Countries, 2000

# GDP and Welfare

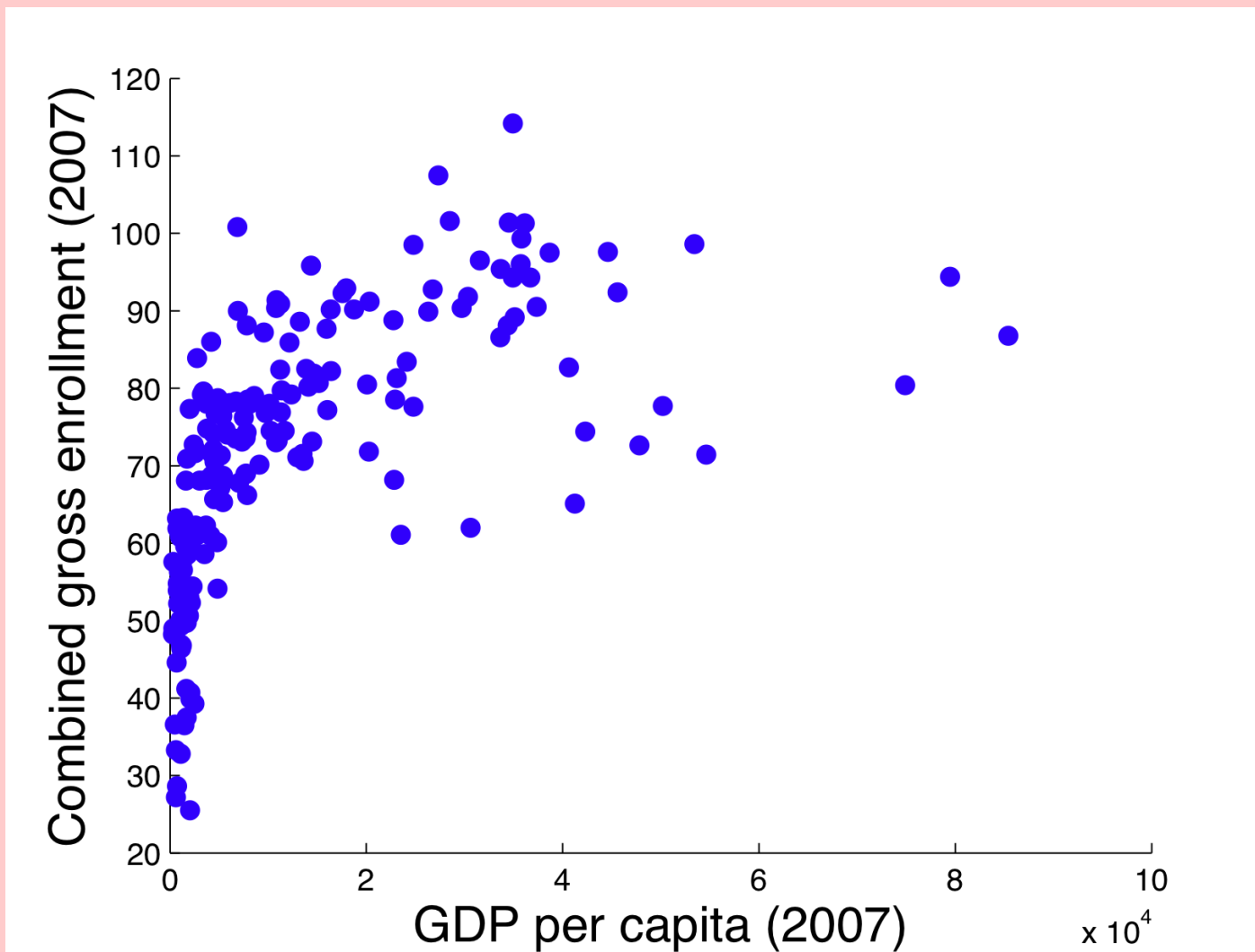
| Country   | Welfare | Per capita income | "Difference" | Life expectancy | C/Y    | Leisure | Inequality |
|-----------|---------|-------------------|--------------|-----------------|--------|---------|------------|
| USA       | 1.000   | 1.000             |              | 0.000           | 0.000  | 0.000   | 0.000      |
|           |         |                   |              | 77.0            | 0.762  |         |            |
| France    | 0.941   | 0.701             | 0.295        | 0.084           | -0.055 | 0.140   | 0.125      |
|           |         |                   |              | 78.9            | 0.721  |         |            |
| Singapore | 0.426   | 0.829             | -0.667       | 0.036           | -0.581 | -0.106  | -0.016     |
|           |         |                   |              | 78.1            | 0.426  |         |            |
| Botswana  | 0.074   | 0.179             | -0.887       | -0.577          | -0.171 | 0.028   | -0.167     |
|           |         |                   |              | 48.9            | 0.642  |         |            |



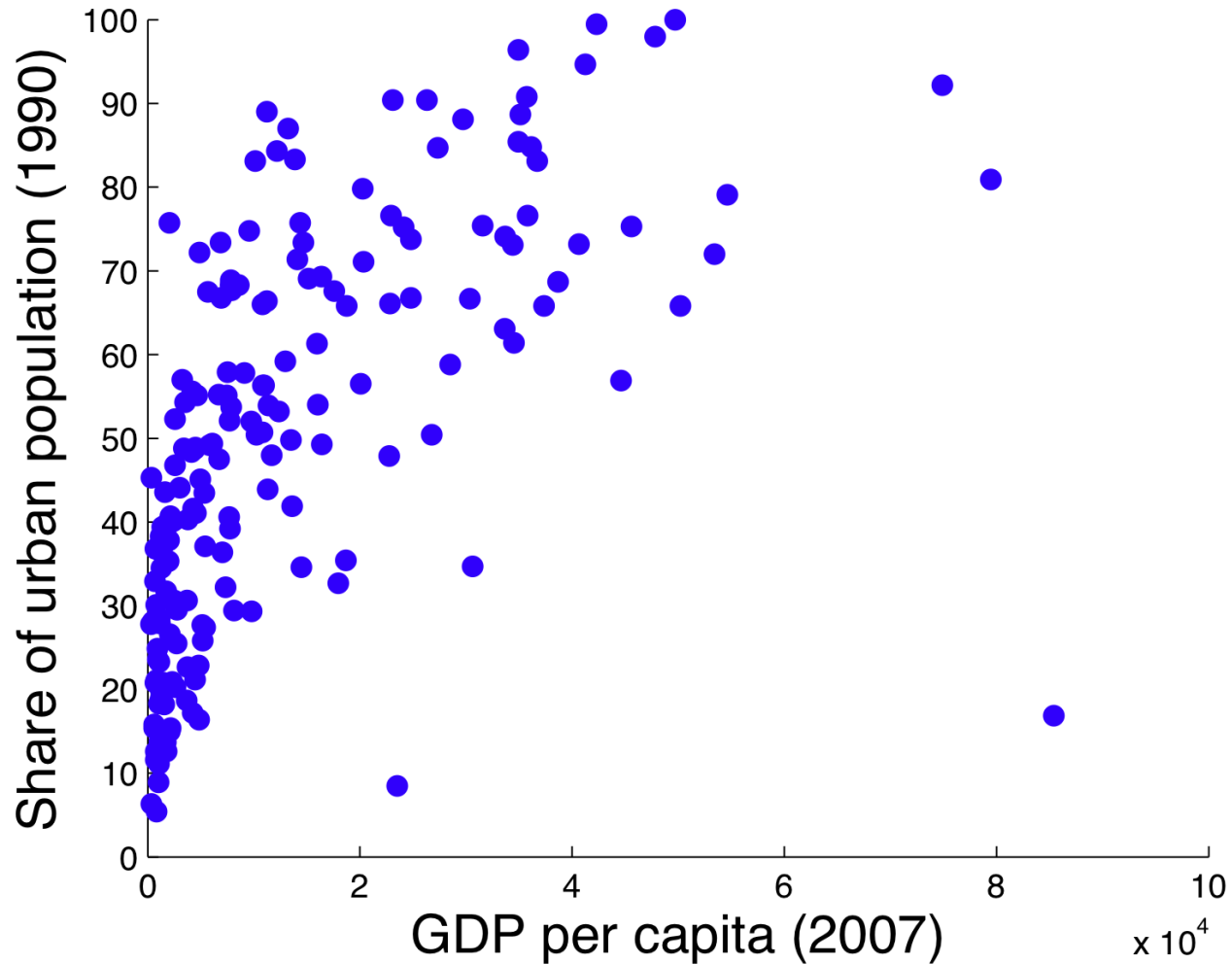
# GDP is not perfect, but...

- Having a large GDP enables a country to afford better schools, a cleaner environment, health care, better infrastructure, etc.
- Many indicators of the quality of life are positively correlated with GDP. For example...

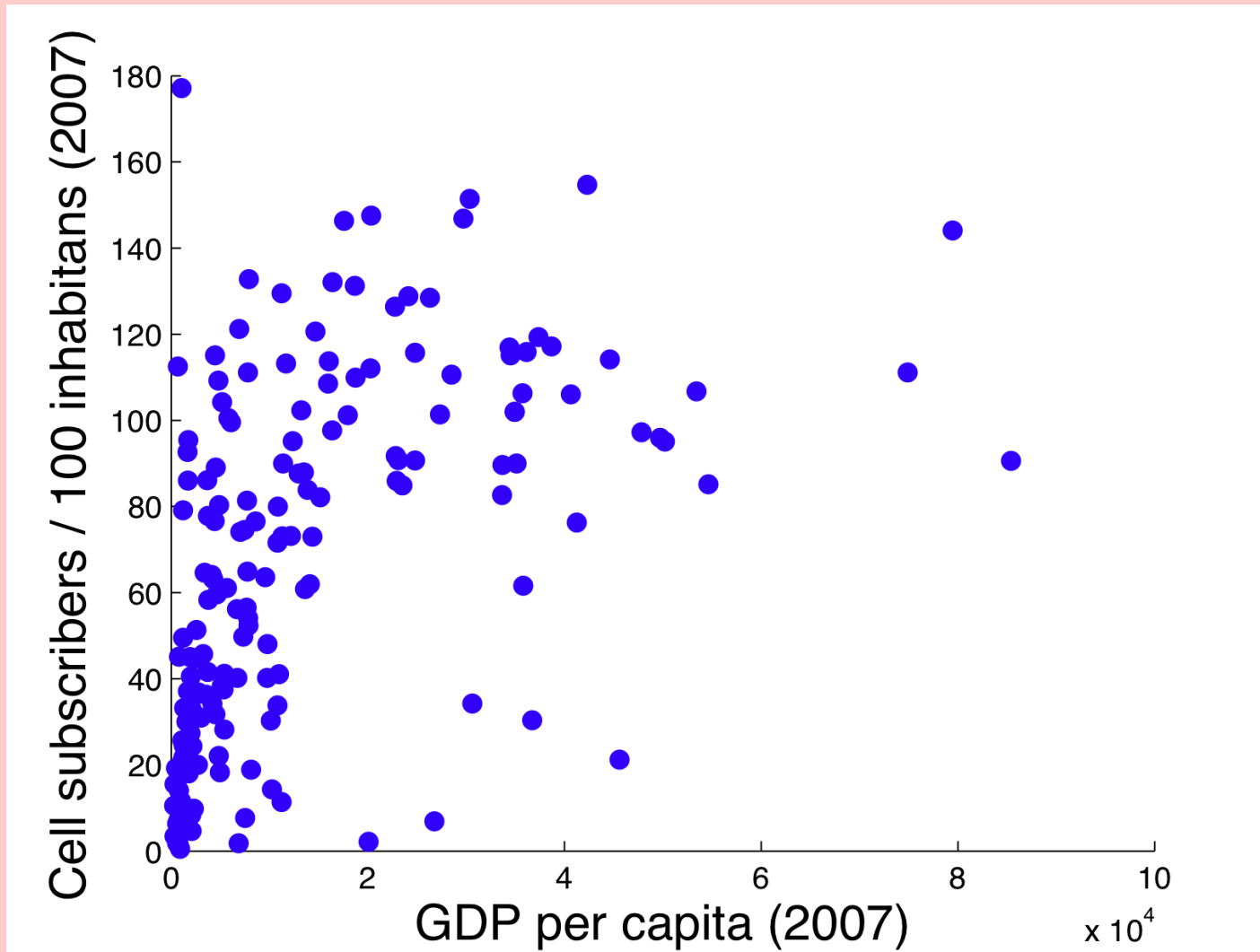
# GDP and School Enrollment



# GDP and Urbanization



# GDP and Cell Phones



# Next Class

- Reading before class: Chapter 11
- Topics: Inflation, the Consumer Price Index, and the Producer Price Index
- From today's lecture, you can do Section 1 of the homework