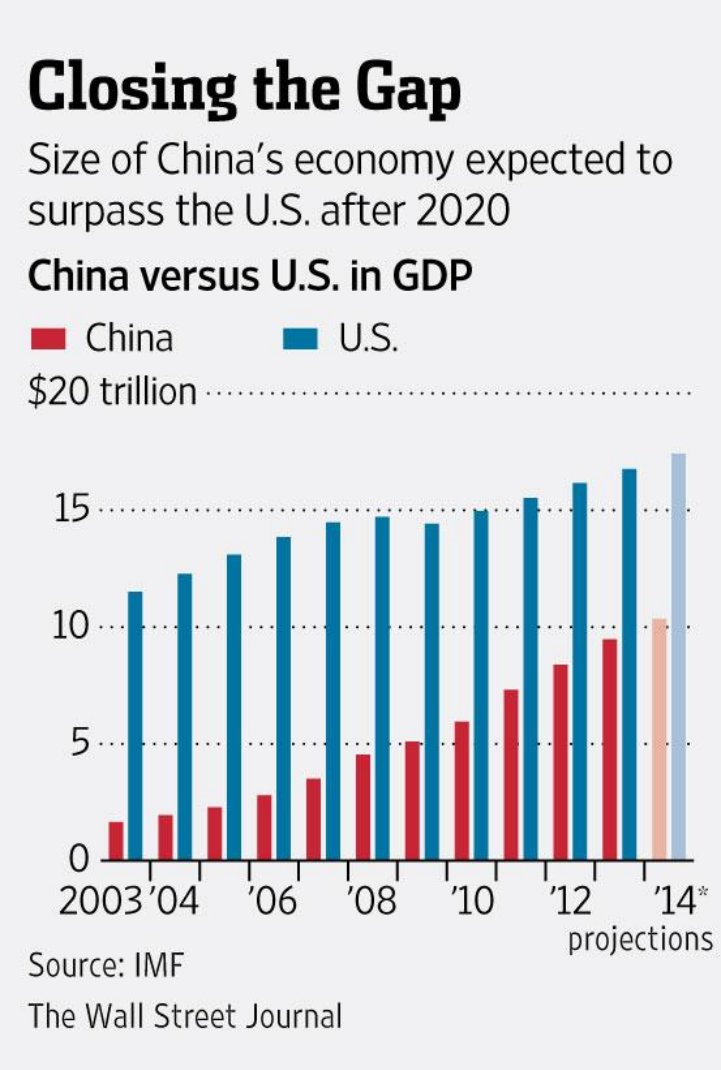
Chapter 15: Spending, Income and GDP

By the end of this chapter, you will be able to:

- **Define GDP**
- **Calculate GDP by:**
  - adding up value added of production.
  - adding up expenditure.
  - adding up income.
- **Distinguish nominal GDP from real GDP.**
- **List some uses and limitations of GDP as a measure of welfare.**

Gross Domestic Product

(GDP)



GDP Definition

Definition: Gross Domestic Product (GDP) is the market value of all of the final goods and services produced within a country in a given time period.

4 parts of definition

1. Market Value:

Suppose the country of Gondor produces the following:

10 oranges
15 cloaks
6 swords

1. Market Value - continued

We must convert the goods to comparable units in order to add them. How should we do this?

1. Market Value – continued

	Quantity	Price per unit
Orange	10	$0.50
Cloak	15	$40
Sword	6	$100

2. Why Just Final Goods and Services?

$4,000 worth of iron ore

$8,000 worth of steel

$1,000 worth of tires

$20,000 car

Should we say that GDP is $4,000 + $8,000 + $1,000 + $20,000 = $33,000?

Final vs. Intermediate Goods and Services

Intermediate goods and services are produced on the way to making the final good.

In order not to double count, we only count final goods in GDP.

3. Produced within a Country

Production that takes place within a country's borders.

Which of these are counted as U.S. GDP?

a. Expeditions from US Ford Plant:

b. Accords from US Honda Plant

c. Cars from General Motors Mexico Plant

Question

Which of the following should **not** be counted in U.S. GDP?

- UCSD tuition

- A foreign tourist's San Diego Zoo admission

- An American's vacation in Italy

- A car produced at Honda's Ohio factory

4. In a given time period

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Measuring GDP by Measuring Production

We already saw how to calculate GDP by adding up the market value of production in a simple economy.

Recall that it gets more complicated when we talk about economies that produce intermediate goods.

In practice, we can't just add up the market value of "final goods" companies because:

- Some production processes take time.
- Many companies produce both intermediate and final goods.

That is why economists have developed the concept of "value added."

Definition:

Value added for a firm

= market value of its product – cost of inputs purchased from other firms.

Note:

1.We subtract out only inputs purchased from other firms, such as raw materials, electricity, business services, etc.

2.We do not subtract out payments to labor (e.g. wages) or the cost of equipment and buildings.

Let's calculate value added for one company

Example: Bakery

Suppose a bakery sells $1,000 worth of baked goods in a day. Let's figure out its value added.

Item	Cost
Flour	$200
Eggs	$ 50
Milk	$100
Gas and electricity	$ 60
Bakers' wages	$400
Cost of renting building and equipment	$190

To calculate GDP for the economy, we can either:

1. Add up only final goods production

or

2. Calculate value added for each producer and then sum it up over all producers to get GDP.

Does this second method really work?

To see that it does, let's go up the supply chain. For simplicity assume that flour is the only intermediate good for the bakery.

$200 in flour

$120 in grain

$120 in grain

$ 0 in inputs

$ 50,000 tractor

Measuring GDP using Expenditures

We could also measure GDP using spending rather than counting up production.

In theory, we should get the same answer. How can this be?

Consider the example of a screw at Home Depot:

Consider a screw at Home Depot

Who Buys it	Classification
Individual	
Government	
Tourist	
Contractor (to build a house or factory)	
No one	

Measuring GDP using Expenditures - continued

We can add up all expenditures for C, G, I, X. Will this equal production?

Measuring GDP using Income

Households sell and firms buy services of labor, capital, and land.

Firms pay income to households – wages for labor, interest and profits for capital, and rent for land. Retained earnings are like household income that is lent back to firms.

Question

Suppose the we have the following data for an economy. What is GDP and what is labor income?

Category	Amount
Consumption expenditures	$600
Investment expenditures	$150
Government expenditures	$200
Net Exports	$ 50
Capital Income	$300

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Nominal GDP, Real GDP and the Price Level

Suppose we are given the following information on production and prices for **The Shire**:

Year	Quantity of mince pies	Price of mince pies	Quantity of Swords	Price of Swords
2004	90	$3.00	15	$100
2014	120	$3.60	20	$120

Implied change in GDP:

Nominal GDP in 2004 =

Nominal GDP in 2014 =

If we want to measure how much actual output rose, we need to decompose the GDP change into 2 parts:

1. The change in actual quantities
2. The change in prices

But remember that it makes no sense to add up quantities.

We still need to use market prices to weight the quantities.

Definition: Real GDP is the value of final goods and services produced in a given year when valued at **constant prices**.

The idea: to calculate real GDP in some year t, use the quantities of goods in year t, but use prices from a **designated base year.**

This is the traditional method for calculating real GDP. We will explain this one first.

1. Base year method of calculating real GDP (traditional method)

Choose a base year – the year whose prices are used to weight the quantities

From previous table, suppose we use 2004 prices to value output in each year:

The Bureau of Economic Analysis used to use fixed, base-year weights for calculating real GDP. In recent years, they switched to chain weighting, which is more complicated but is less sensitive to the choice of base year.

One of the reasons for the switch is that the rapid decline in computer prices made results change a lot when the base year changed.

Actual formula for real GDP growth using chain-weighting:

$$\frac{Y(t)}{Y(t-1)} = \sqrt{\frac{\sum_{i=1}^{n} P_i(t)Y_i(t)}{\sum_{i=1}^{n} P_i(t)Y_i(t-1)} \; x \; \frac{\sum_{i=1}^{n} P_i(t-1)Y_i(t)}{\sum_{i=1}^{n} P_i(t-1)Y_i(t-1)}}$$

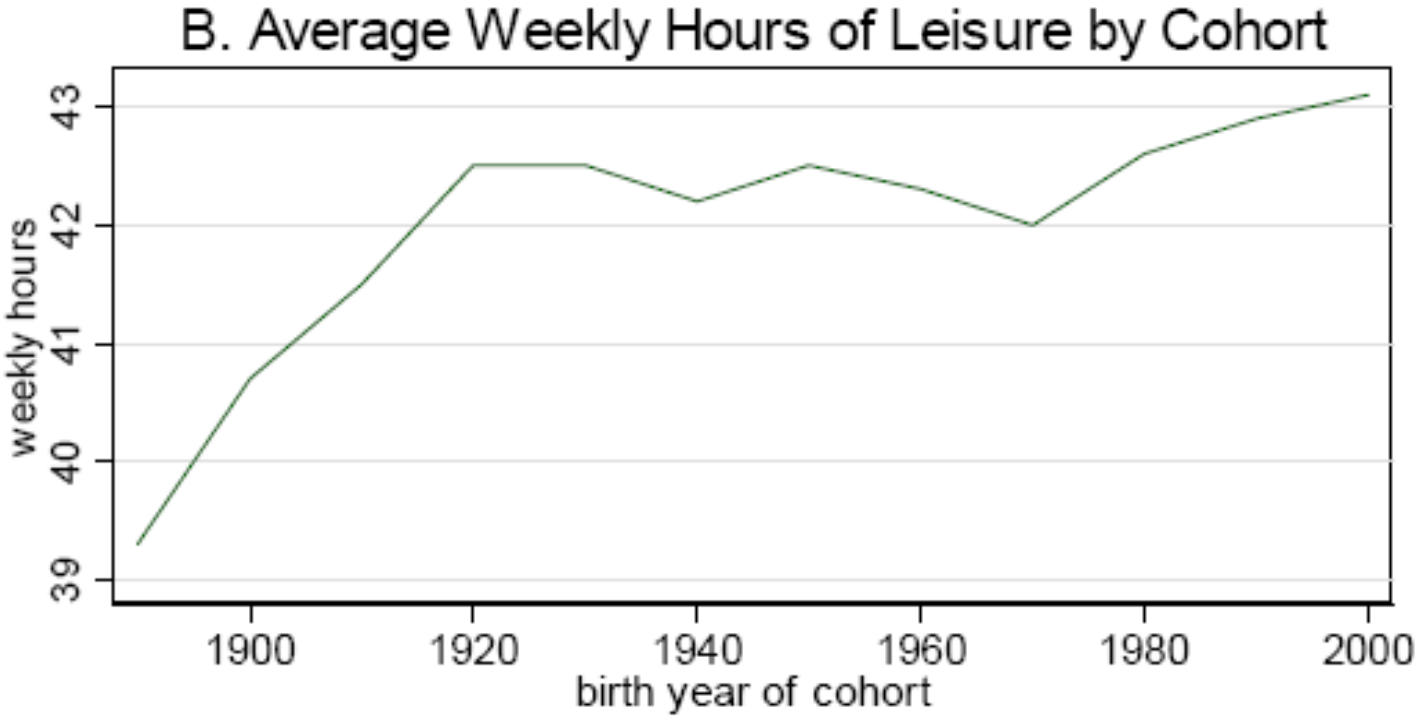
Consider the increase in real GDP between 2013 and 2014. Suppose that at 2013 base year prices, the second term is 1.10 (implying a 10% increase) and at 2014 base year prices the first term is 1.20 (implying a 20% increase).

V. Uses and Limitations of Real GDP

Economic Welfare Comparisons over Time and Across countries

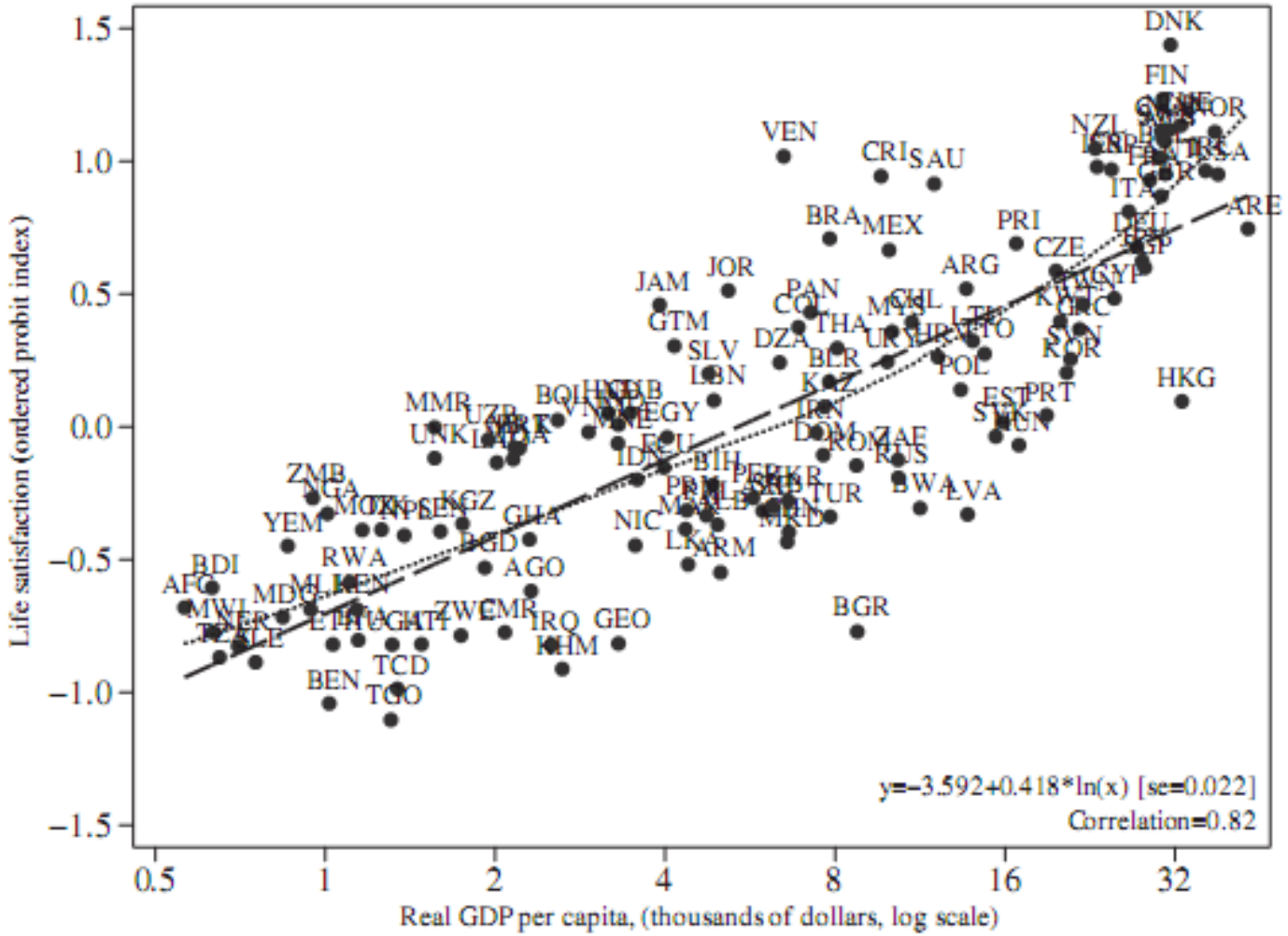
Real GDP per capita is now more than 10 times what it was in 1889. Are we 10 times better off?

Evidence on Leisure Trends from
"A Century of Work and Leisure" by Valerie Ramey and Neville Francis



GDP is highly correlated with measures of happiness
(Stevenson and Wolfers, Brookings, 2008)

Figure 4. Life Satisfaction and Real GDP per Capita: Gallup World Poll[a]



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