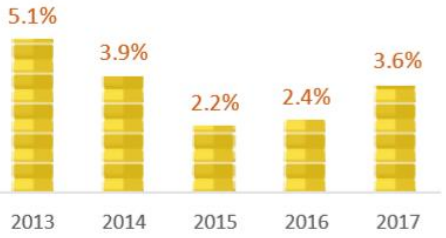
Key Indicators



4.1 LABOUR FORCE

	Unit	2011	2012	2013	2014	2015	2016	2017
Labour Force								
Total	'000	3,237.1	3,361.8	3,443.7	3,530.8	3,610.6	3,672.8	3,657.0
Residents	'000	2,080.1	2,119.6	2,138.8	2,185.2	2,232.3	2,257.6	2,269.7
Employed								
Total	'000	3,149.7	3,274.7	3,352.9	3,440.2	3,516.0	3,570.0	3,550.1
Residents	'000	1,998.9	2,040.6	2,056.1	2,103.5	2,147.8	2,165.3	2,175.3
Unemployed								
Total	'000	87.4	87.1	90.7	90.7	94.6	102.8	106.9
Residents	'000	81.2	79.0	82.6	81.8	84.5	92.3	94.4
Unemployment Rate (Seasonally Adjusted)								
Total	%	2.0	1.9	2.0	1.9	2.0	2.1	2.2
Residents	%	2.9	2.8	2.9	2.8	2.8	3.0	3.1
Resident Labour Force Participation Rate	%	66.1	66.6	66.7	67.0	68.3	68.0	67.7
Male	%	75.6	76.0	75.8	75.9	76.7	76.2	76.0
Female	%	57.0	57.7	58.1	58.6	60.4	60.4	59.8

Division and Group	Weights [1]	2011	2012	2013	2014	2015	2016	2017
	Consumer Price Index							
All Items	10,000	92.5	96.7	99.0	100.0	99.5	98.9	99.5
Food	2,167	93.0	95.1	97.1	100.0	101.9	104.0	105.5
Clothing & Footwear	273	99.0	100.5	100.8	100.0	100.1	100.3	100.9
Housing & Utilities	2,625	89.6	97.1	99.9	100.0	96.5	92.5	90.2
Household Durables & Services	475	91.4	93.6	98.2	100.0	99.4	101.2	102.2
Health Care	615	89.8	93.7	97.3	100.0	99.9	101.0	103.5
Transport	1,579	92.4	99.0	101.2	100.0	98.6	96.2	98.7
Communication	385	101.7	101.6	100.2	100.0	100.3	99.9	100.5
Recreation & Culture	788	96.2	97.1	98.2	100.0	100.3	101.2	101.6
Education	615	89.5	93.1	96.7	100.0	103.4	106.6	109.8
Miscellaneous Goods & Services	478	95.9	96.9	98.7	99.9	99.9	100.1	100.3
All Items less Imputed Rentals on Owner-Occupied Accommodation [2]	8,101	93.6	97.0	98.8	100.0	100.1	100.3	102.0
All Items less Accommodation	7,713	93.7	96.9	98.8	100.0	100.1	100.4	102.3
MAS Core Inflation Measure [3]	6,564	94.0	96.4	98.1	100.0	100.5	101.4	102.8

Measurement in Macroeconomics

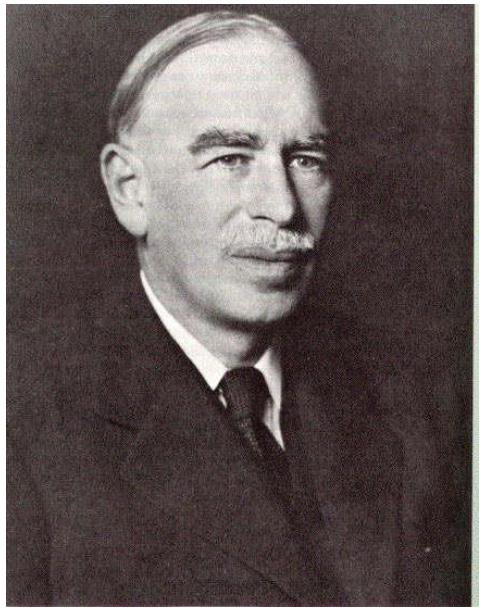
EC1101e Macro Lecture 01

Origins of Macroeconomics

Classical economics: let markets work their magic

Great Depression (1929 – 1939): Stock market crash, bank failures, massive rise in unemployment, throughout the world

Theory

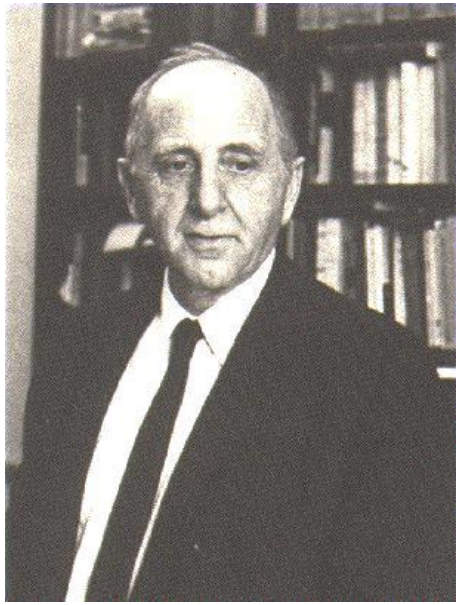


John Maynard Keynes
1883 - 1946

Policy

Franklin D. Roosevelt
1882 - 1945

Measurement



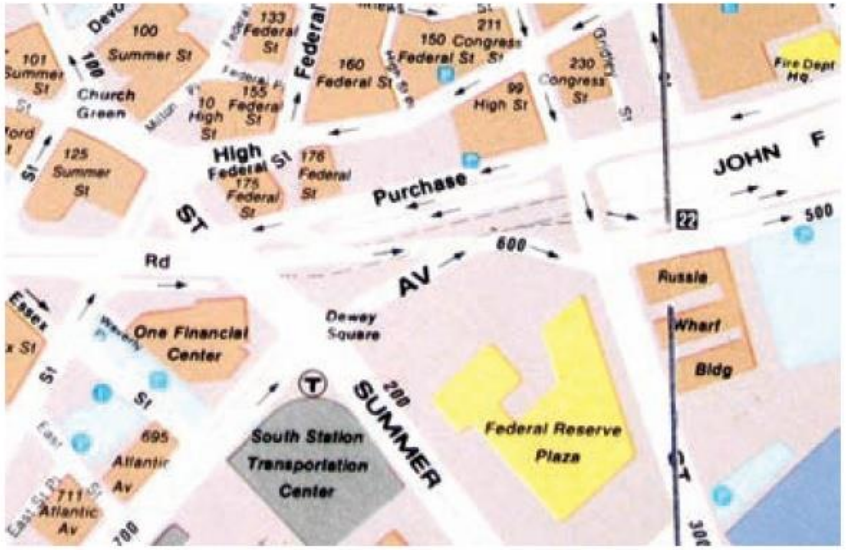
Simon Kuznets
1901 - 1985

Micro versus Macro in Economics

- Firms, households

- Whole economies

Micro versus Macro in Economics



- Controlled experiments are possible, if uncommon
- Natural experiments are plentiful
- More observations
- More consensus

- Controlled experiments are impossible
- Natural experiments are rare
- Fewer observations
- More controversy

MTI MINISTRY OF TRADE AND INDUSTRY SINGAPORE

Singapore's GDP Contracted by 3.8 Per Cent in the Fourth Quarter of 2020

4 January 2021. Based on advance estimates for the fourth quarter of 2020,[1] the Singapore economy contracted by 3.8 per cent on a year-on-year basis, an improvement from the 5.6 per cent contraction recorded in the third quarter. On a quarter-on-quarter seasonally-adjusted basis, the economy grew by 2.1 per cent, following the 9.5 per cent expansion in the third quarter.[2] For the whole of 2020, the Singapore economy contracted by 5.8 per cent.

Ministry of Trade and Industry Press release, 2021 January 04

A preview

Measurement in Macro

GDP, Prices, Unemployment

Long Run Macro

Economic Growth, Say's Law

Short Run Macro

Demand shocks, Countercyclical fiscal policy

Money and Banking

Bank money creation, financial crises

Monetary Policy

Interest rate policy, quantitative easing

International Macro

Currency markets, Trade balance

You can't manage what you can't **measure**

Peter Drucker

Goals and measurements in Macro

Goal	Main Indicators
High and sustained economic growth	Real GDP Real GDP per capita
Stable prices	Consumer Price Index
Low unemployment	Unemployment rate

Agenda

1. Measuring production

2. Measuring the price level and inflation

3. Measuring unemployment and employment

Next Week

Agenda

1. Measuring production

- **Goal: Economic Growth**
- **Indicator: Gross Domestic Product**
- Three approaches to measuring GDP
- Comparing GDP over time
- Problems with GDP

2. Measuring the price level and inflation

3. Measuring unemployment and employment

Goal: Economic growth

The purpose of an economy is **economic production**: to have its participants make **goods and services (g&s),** that satisfy one another's needs and wants

- **Goods**: tangible objects, ownership can be transferred, e.g., T-shirt
- **Services**: enjoyed while produced, inseparable from their production, e.g., hairdressing

Economic growth = rise in an economy's economic production per period

Active learning: goods and services

In which of the following scenarios is the dollar amount measuring the value of a good or service?

A. DBS Bank makes a **$10,000** personal loan to Jerry.
B. SP Power charges **$100** for electricity supplied to the Tan household.
C. Malik deposits **$100,000** into his OCBC bank account.
D. Nvidia buys 80 million Qualcomm shares for **$10 billion**.

Why is economic growth desired?

Required for improvements in living standards and well-being

Provides society with a sense of progress

Helps society avoid conflicts over distribution

Indicator: Gross Domestic Product (GDP)

A typical definition of Gross Domestic Product (GDP):

Total monetary value of

final goods and services produced

in a country

during a given time period

Monetary value

Consider a small economy that produces donuts and lattes

	Donuts		Lattes	
Year	**Price**	**Quantity**	**Price**	**Quantity**
2016	$10	400	$2.00	1,000

Monetary values are needed to add donuts and lattes together

- These g&s are sold in the marketplace → use **market prices**

2016 GDP = $(P_D \times Q_D) + (P_L \times Q_L) = (\$10 \times 400) + (\$2 \times 1{,}000)$

$= \$6{,}000$

GDP is a weighted sum of g&s, with the **monetary values as weights**

Indirect measurement of monetary values

Financial services	Some financial sector services produced by banks for customers are not directly charged for
	Indirectly measured by the **spread** (i.e., difference) between **interest earned on loans** and **interest paid on deposits**
Housing services	For tenants, value of housing services enjoyed is measured by **rent paid**
	For owner-occupiers, value of housing services enjoyed (**imputed rent**) is indirectly measured by **rents paid for similar houses**

Monetary values when there are no market prices

G&S produced by governments and non-profits

Specialized equipment produced for firms' own use

In these cases, monetary value is estimated by the **cost of production**

"Final"

US$250,000 Ferrari 488 GTB, sold to customer

US$1,000 Pirelli tire, sold to Ferrari and fitted on the 488 GTB

The $4,000 value of four tires is **part of** the car's $250,000 value

Final good

sold to its "final user"

Intermediate good

used up to produce some other good

“in a country”

GDP is measured based on **geographical boundaries** of countries

Count if the production happens within the country’s borders

Interesting case: Royal Thai **embassy** located in Singapore is considered part of Thailand’s GDP

“In a given period”

Stock	Flow
Measured at a point in time	Measured across a period

Bags of rice in warehouse *on 1 Jan 2020* = 1,000

Bags of rice in warehouse *on 1 Jan 2021* = 1,200

Change in bags of rice in the warehouse *in the year 2020* = +200

GDP is a flow, typically measured across a calendar year

Agenda

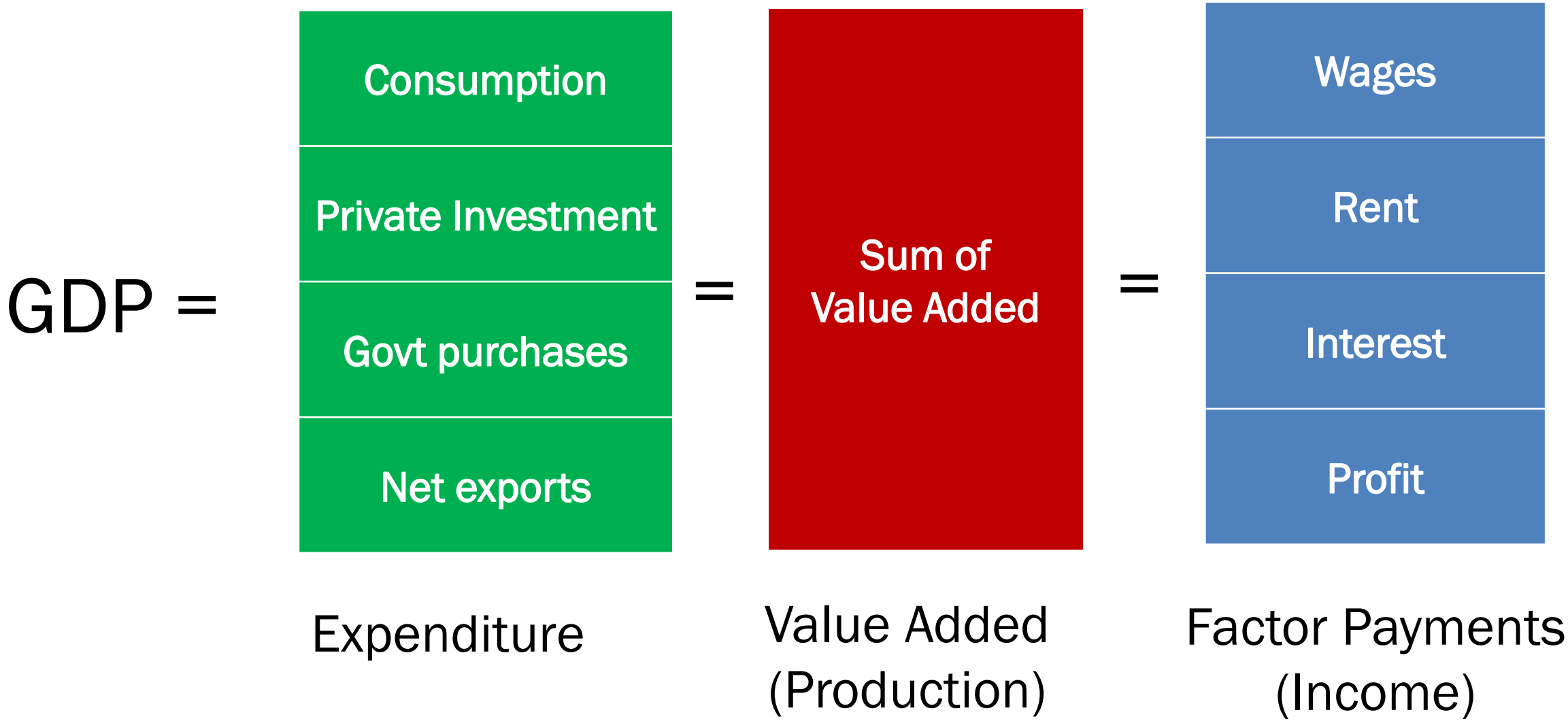
1. Measuring production

- Goal: Economic Growth
- Indicator: Gross Domestic Product
- **Three approaches to measuring GDP**
- Comparing GDP over time
- Problems with GDP

2. Measuring the price level and inflation

3. Measuring unemployment and employment

Measuring GDP: Three Approaches



Expenditure Approach: Y = C + I + G + NX

Y is often used in economics to represent GDP

Classify components of GDP by user type

- **C: Private Consumption expenditure** by households
- **I : Private Investment expenditure** by businesses
- **G: Government expenditure** by the government
- **NX: Net Exports expenditure** by the rest of the world

Expenditure approach shows importance of each expenditure component

C for Private Consumption

Private Consumption (C) , a.k.a. Household Final Consumption: g&s purchased by households as final users …

… with a notable exception: **C excludes** the purchase of new homes

Note: **C includes** value of housing services enjoyed by both tenants and owner-occupiers

I for Private Investment – capital goods

Private Investment (I) refers to g&s purchased by business firms as final users.

This includes expenditure on **capital goods**, i.e., goods made to help produce other g&s

- Machinery, equipment
- Infrastructure, e.g., roads, buildings
- Intellectual property products, e.g., software, databases, original literary works

The term '**Gross**' in GDP comes from capital goods (Macro 2)

I for Private Investment – change in inventories

Also included in private investment: change in inventories

Inventories = goods stored by firms for future use

- Could be produced by the firm, or purchased from other firms
- Could be finished products, or components

Quantity of inventories at any point in time is a **stock variable**

Change in inventories over time is a **flow variable**

G for Government expenditure

Government expenditure (G) a.k.a. **government purchases**, refers to expenditure on g&s by government as final user

G can be split into

- **government consumption,** such as pantry supplies for government workers
- **government investment,** such as highways, bridges, railroads

G does not include govt **transfers** to households, e.g., cash handouts to the poor

NX for Net Exports

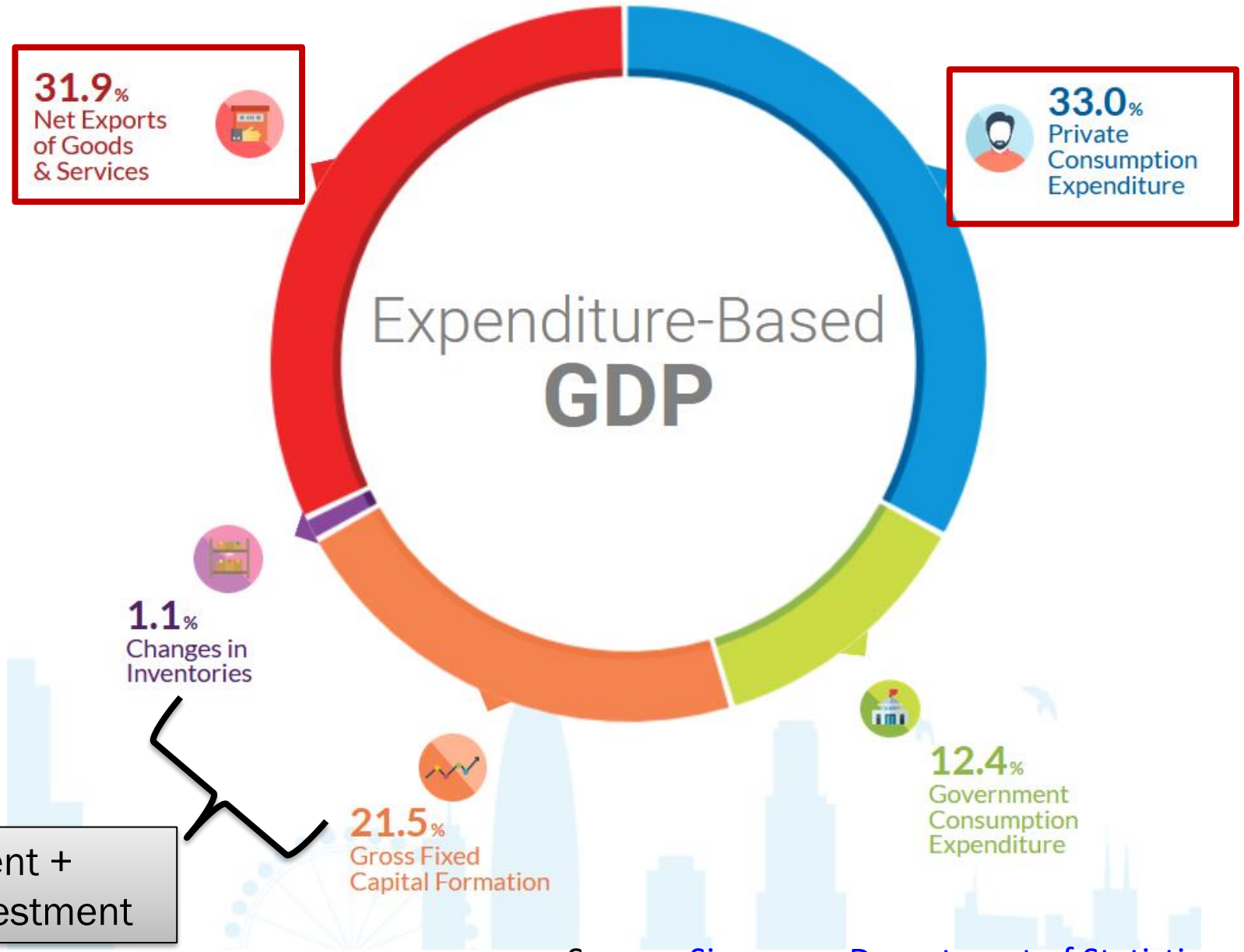
Economies that trade with other economies are called **open** economies (as opposed to **closed** economies)

- **Exports** = g&s produced domestically, purchased by foreign residents
- **Imports** = g&s produced abroad, purchased by domestic residents
- **Net exports (NX)** = Exports – Imports

Why subtract imports in the expenditure approach?

- **Because C, I and G include imports**

Share of GDP by expenditure component, Singapore 2020



Private Investment + Government Investment

Source: Singapore Department of Statistics

Active Learning: Expenditure Approach

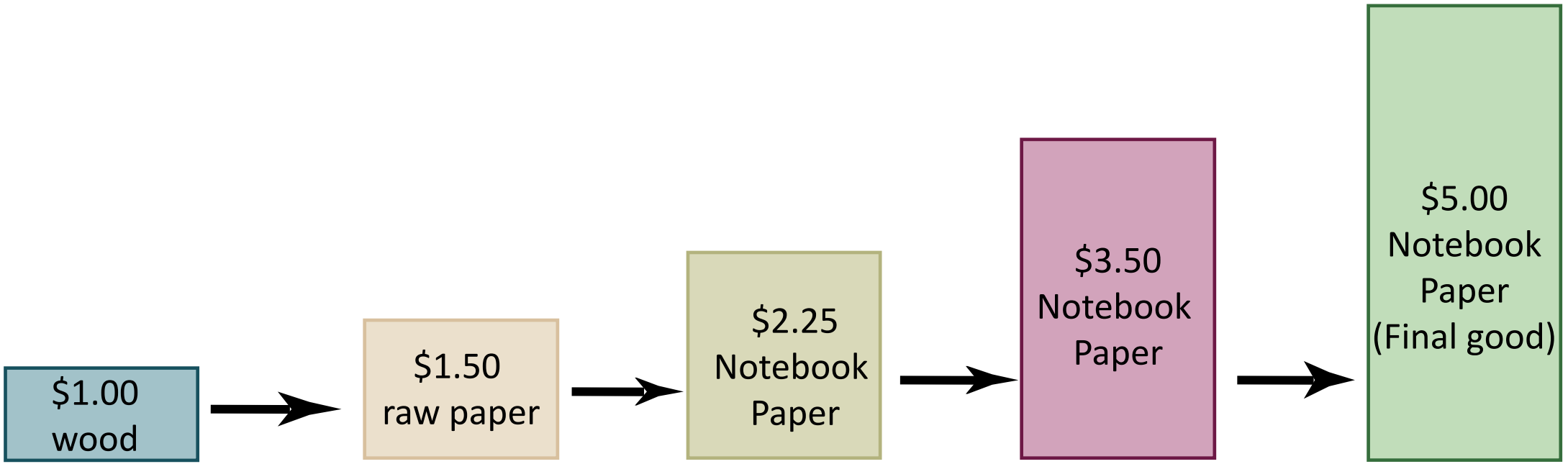
Nike USA purchases 100 pairs of rubber soles from its overseas supplier for $500. It uses 40 pairs to make 40 pairs of shoes, which it sells to USA consumers for $20 each. How does USA's GDP and its expenditure components change?

C	I	NX	GDP

Value added and Value of final g&s

A firm's Value Added = Value of g&s it produces _ Value of intermediate g&s it uses up

$1.00	+	$0.50	+	$0.75	+	$1.25	+	$1.50
Lumber Mill		**Paper Mill**		**Manufacturer**		**Distributor**		**Retailer**



Share of GDP by sectorial value-added, 2020

Y = Sum of Value-added

The Value-Added approach reveals the contribution of various industrial sectors to GDP

Source: [Singapore Department of Statistics]

Income (factor payments) approach: Y = Income

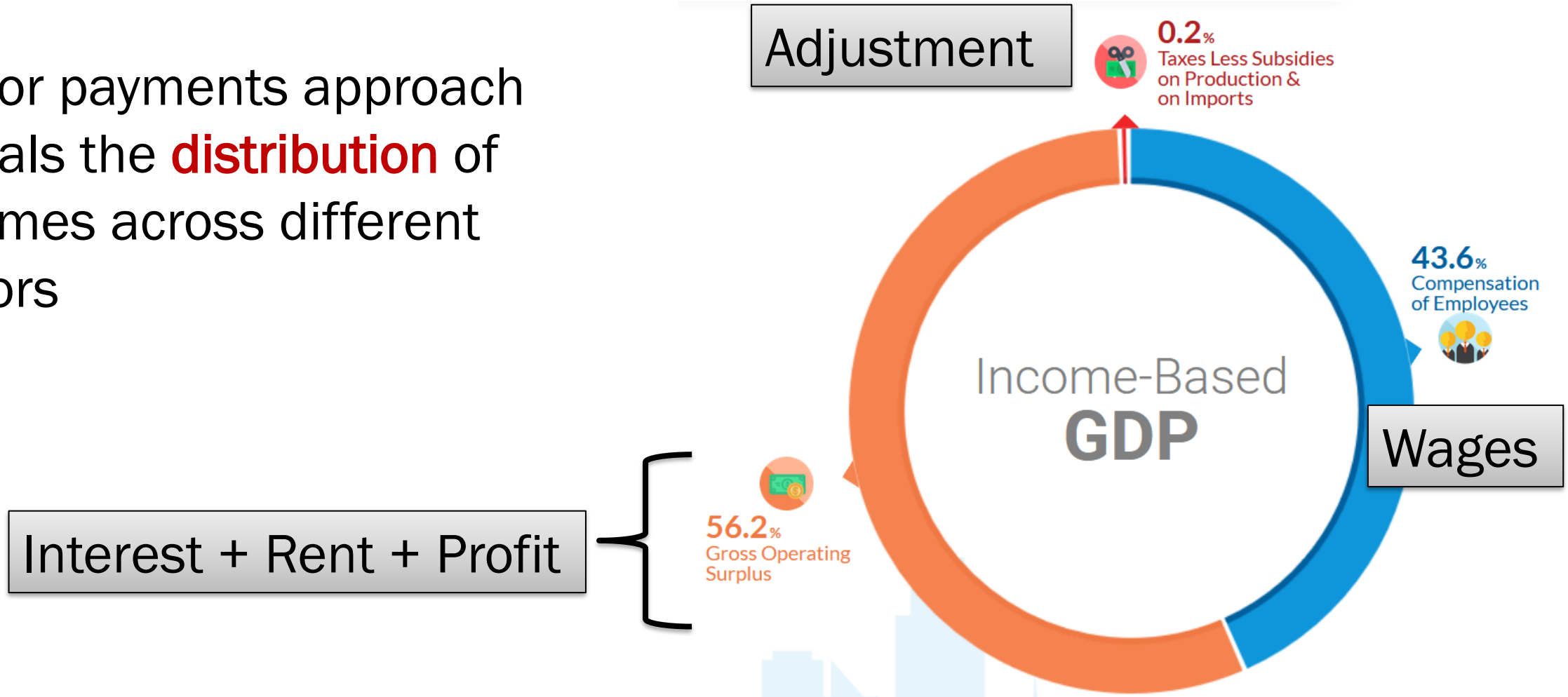
A firm's value-added (after a small adjustment), is paid out to owners of factors of production

- **Wages** → payments to workers
- **Interest** → payments to financiers
- **Rent** → payments to landlords
- **Profit** → income accruing to firms' owners (i.e., what's left of value added after paying all other factors)

Hence, **sum of value added = sum of factor incomes**

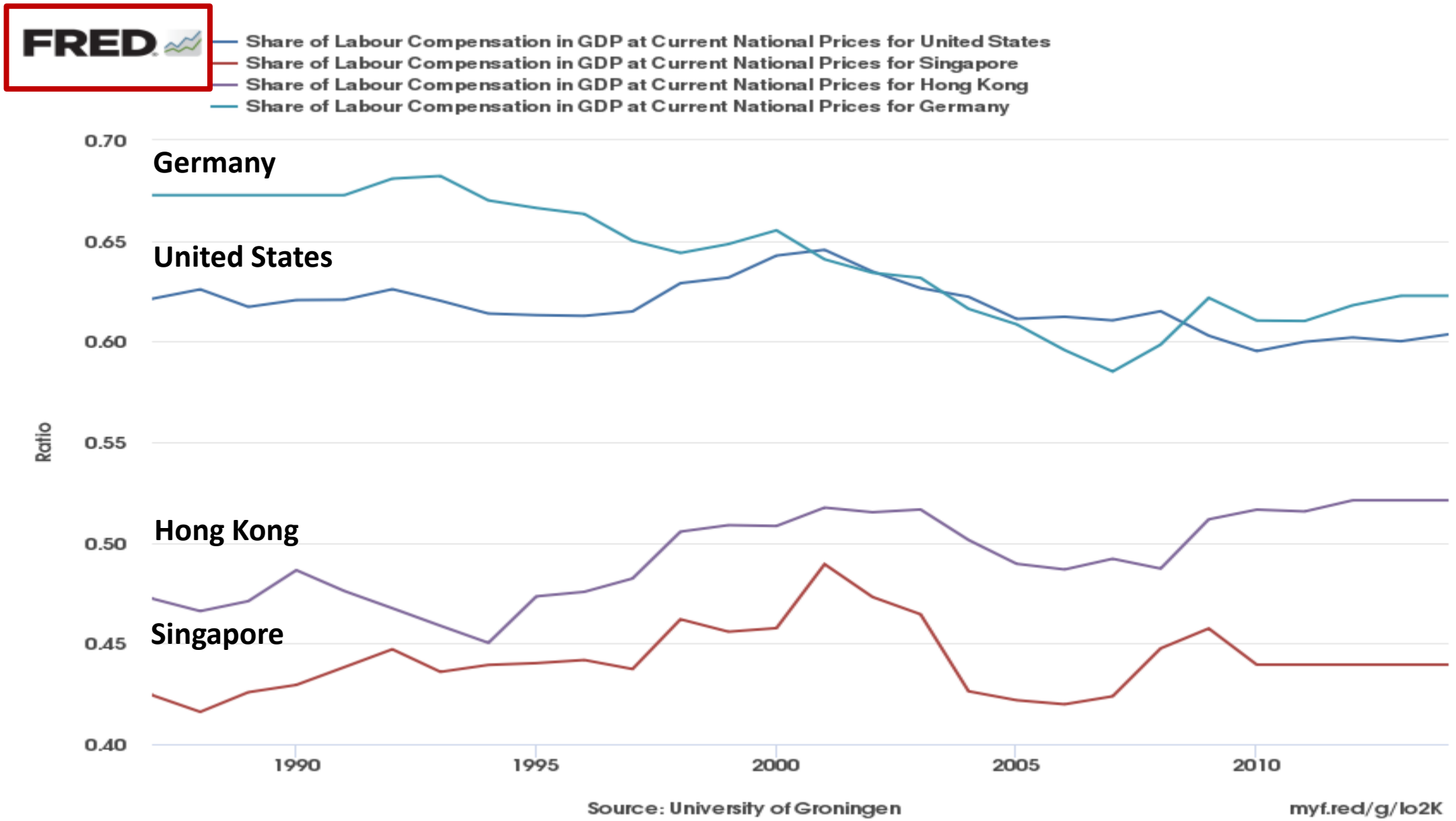
Share of GDP by factor payments, Singapore 2020

Factor payments approach reveals the **distribution** of incomes across different factors



Source: Singapore Department of Statistics

Share of wages in GDP, selected countries, 1980-2013



Agenda

1. Measuring production

- Goal: Economic Growth
- Indicator: Gross Domestic Product
- Three approaches to measuring GDP
- **Comparing GDP over time**
- **Problems with GDP**

2. Measuring the price level and inflation

3. Measuring unemployment and employment

Comparing GDP across time

Consider this small economy:

	Donuts		Lattes	
Year	Price	Quantity	Price	Quantity
2016	$10	400	$2.00	1,000
2017	$11	500	$2.50	1,100

10% increase

25% increase

GDP 2016 = ($10 x 400) + ($2.00 x 1000) = $6,000

GDP 2017 = ($11 x 500) + ($2.50 x 1100) = $8,250

Growth rate = rate of change per unit time = (Current – Previous) / Previous

Growth rate of GDP in 2017 = (8,250 – 6,000)/6,000 = 37.5% (per year)

Nominal GDP versus Real GDP

The GDP computed earlier is the economy's **Nominal GDP**, also known as **GDP at current prices**

But production didn't grow 37.5% → part of the nominal GDP growth came from price increases

To make better comparisons of GDP over time, use **Real GDP**

"**Fixed-base**" approach to compute Real GDP:

- Choose a **base year**
- Use **base year prices** to value production for all years

Real GDP via the fixed-based approach is also known as **GDP at constant prices**

Active Learning: Nominal GDP versus Real GDP

	Donuts		Lattes	
Year	Price	Quantity	Price	Quantity
2016	$10	400	$2.00	1,000
2017	$11	500	$2.50	1,100

With 2016 as base year, compute **real GDP**

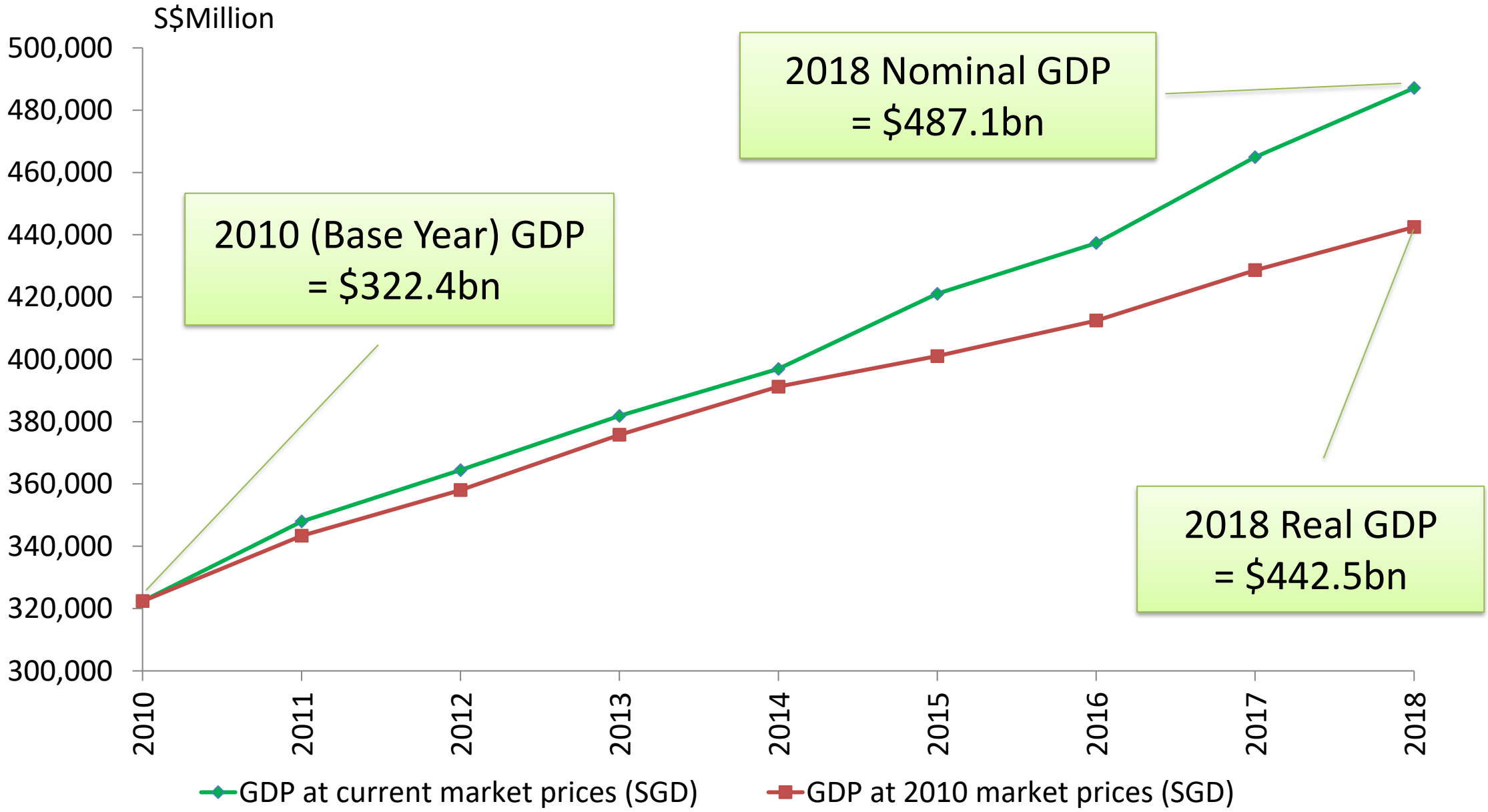
2016: ($10 x 400) + ($2.00 x 1000) = $6,000

2017: ($___ x 500) + ($_____ x 1100) = $_____

Compute the growth rate of **real GDP** in 2017:

Growth rate in 2017 = (_____) /6,000 x 100% = ____ %

Singapore nominal and real GDP (fixed-base approach)



The GDP Deflator

A by-product of real GDP computation is the **GDP deflator**, which can be used as a measure of the **price level of g&s included in GDP**

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

Year	Nominal GDP	Real GDP	GDP Deflator
2016	$6,000	$6,000	100 x (6,000 / 6,000) = 100
2017	$8,250	$7,200	100 x (8,250 / 7,200) = 114.6

Problems with GDP

Two kinds of problems with GDP

1) Measurement problems

2) Problems with using GDP as an indicator of well-being

Measurement problems: quality changes

Quality changes should be accounted for

- A higher quality product should count as “more production”

But this is hard because quality is somewhat subjective. Thus, often not done.

2016 Donut
$10

2017 Donut
$11

Measurement problem: ‘free’ g&s

‘Free’ g&s are becoming more important

Yes, there are associated payments for advertising services

But this likely vastly underestimates the value of these products

Measurement problem: the Shadow Economy

The Shadow Economy, a.k.a. Underground Economy, consists of informal, illegal, unreported market activities

Data about shadow economy is, almost by definition, hard to obtain

Consequences:

- Measured GDP can be affected by changes in extent of data reporting and legality, even if production is unchanged
- Hard to compare GDP across countries if there are large differences in importance of the shadow economy

Estimated size of the Shadow Economy by % GDP

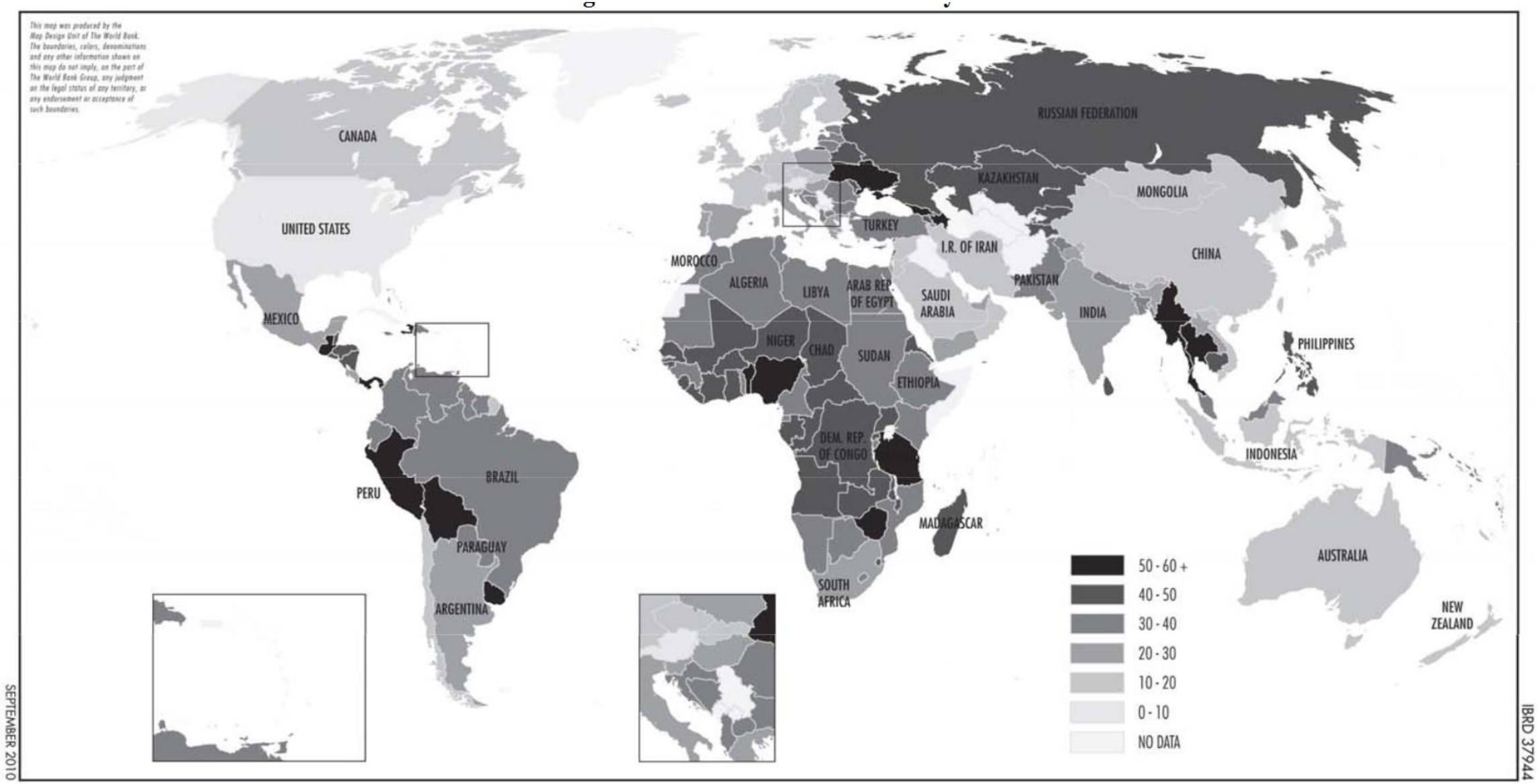
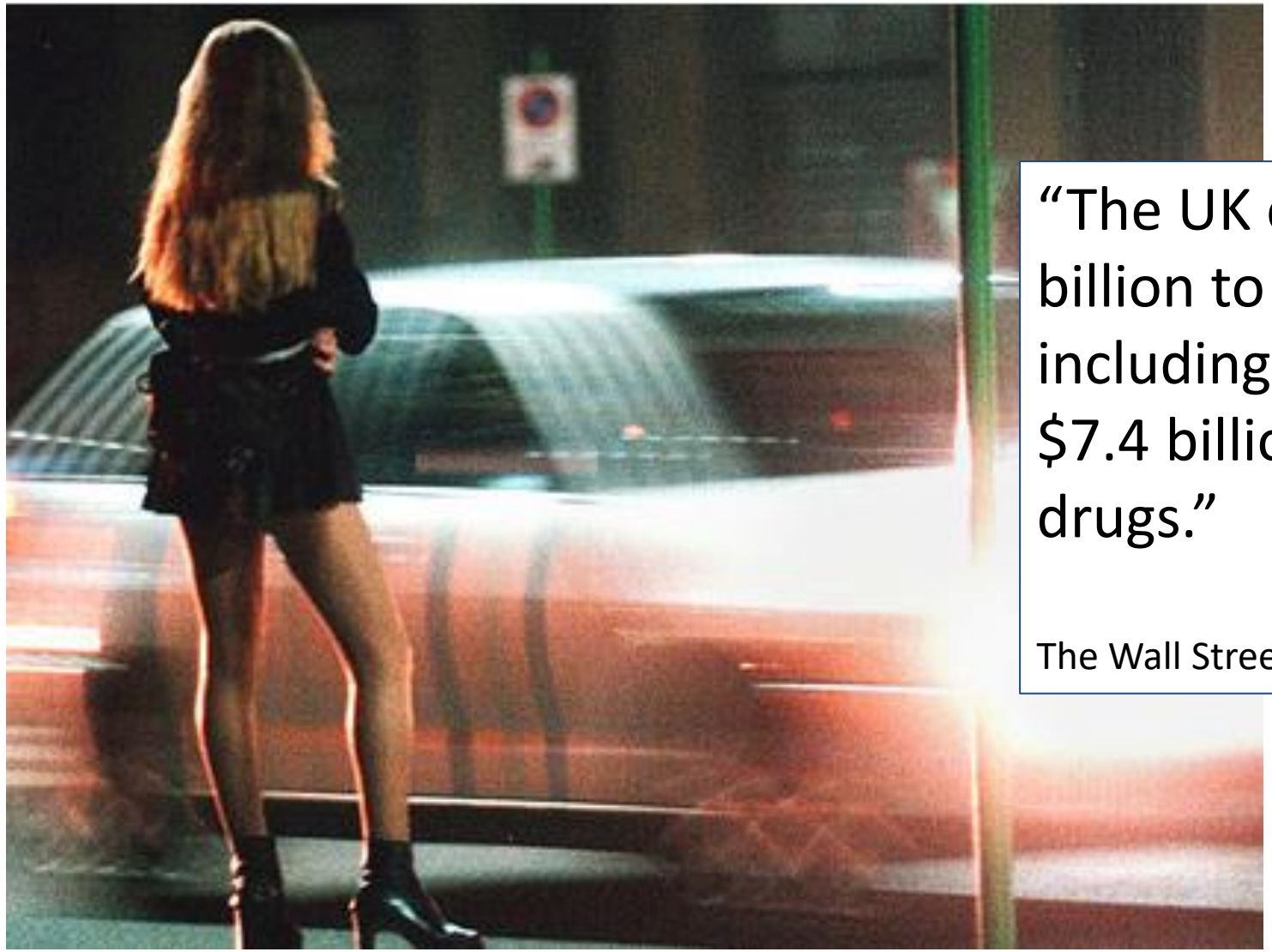


Figure 4 p. 32 in Schneider, Buehn and Montenegro (2010) *Shadow Economies all over the world*.

Sex, Drugs and GDP



"The UK could add as much as $9 billion to the value of its GDP by including prostitution and about $7.4 billion by adding illegal drugs."

The Wall Street Journal, June 8 2014

Sex, Drugs and GDP

"Some countries already include dope and bootleg booze in their statistics: in the Netherlands, for example, cannabis sales may be counted as coffee-shop revenues."

The Economist, 31 May 2014

Problems with using GDP as indicator of well-being

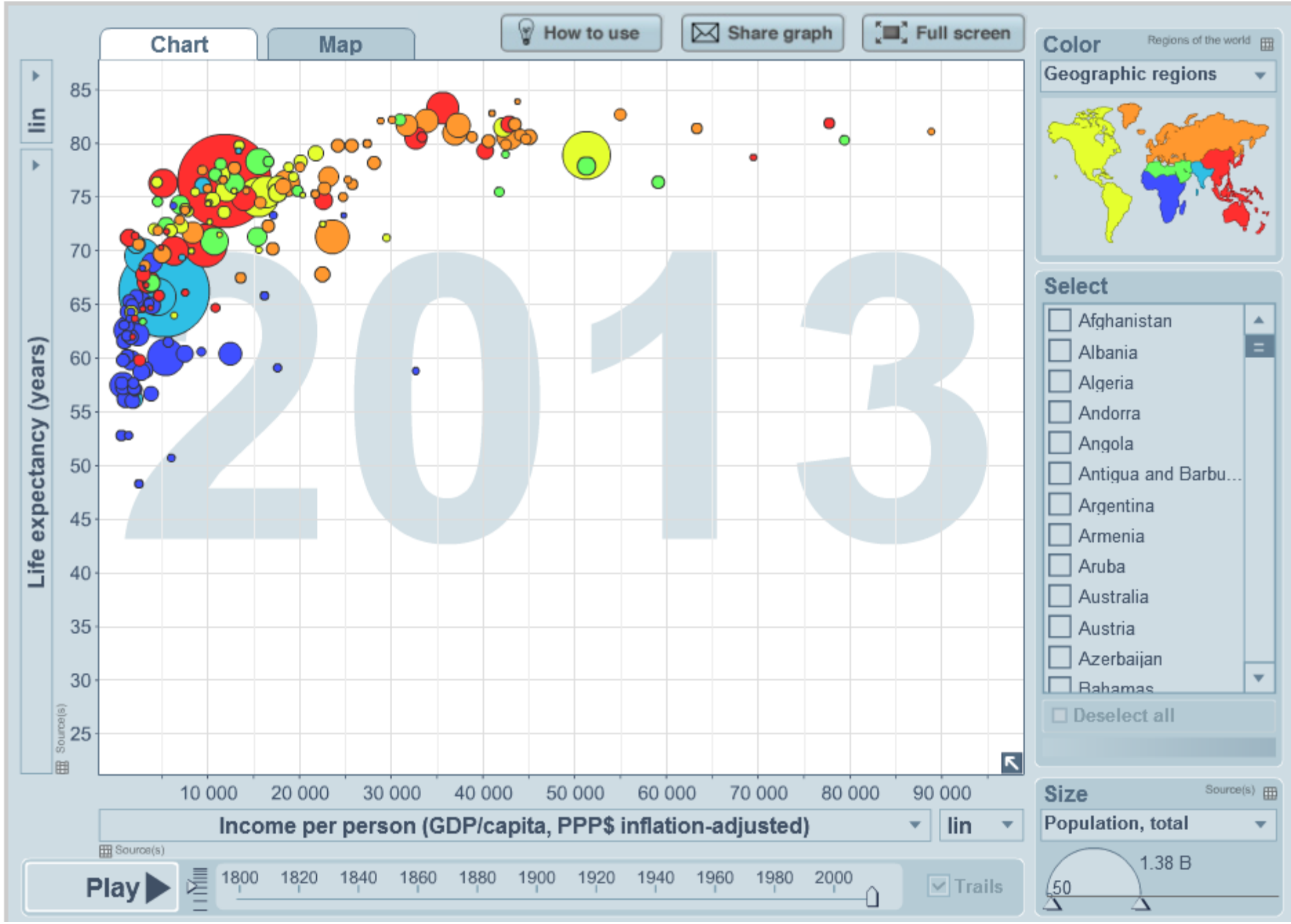
Many important things that matter to well-being aren't captured by GDP, and may sometimes be sacrificed, e.g.

- Leisure time, congestion, crime
- Civil rights, culture, sense of community
- Environmental degradation
- Inequality, poverty, literacy, health
- Household services produced by homemakers

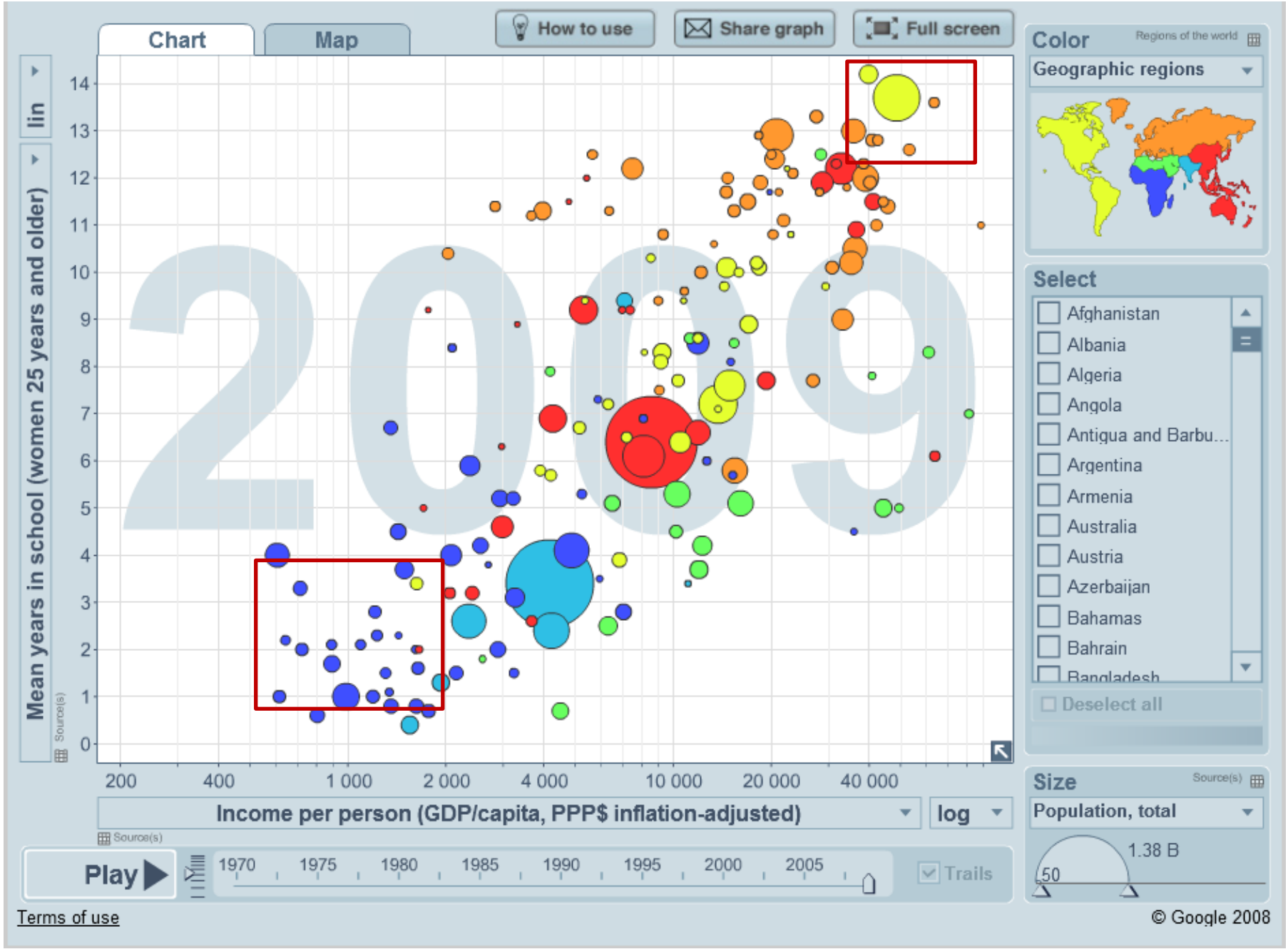
Still, few economists advocate abandoning GDP

GDP and Life Expectancy

Gapminder.org



GDP and female education attainment

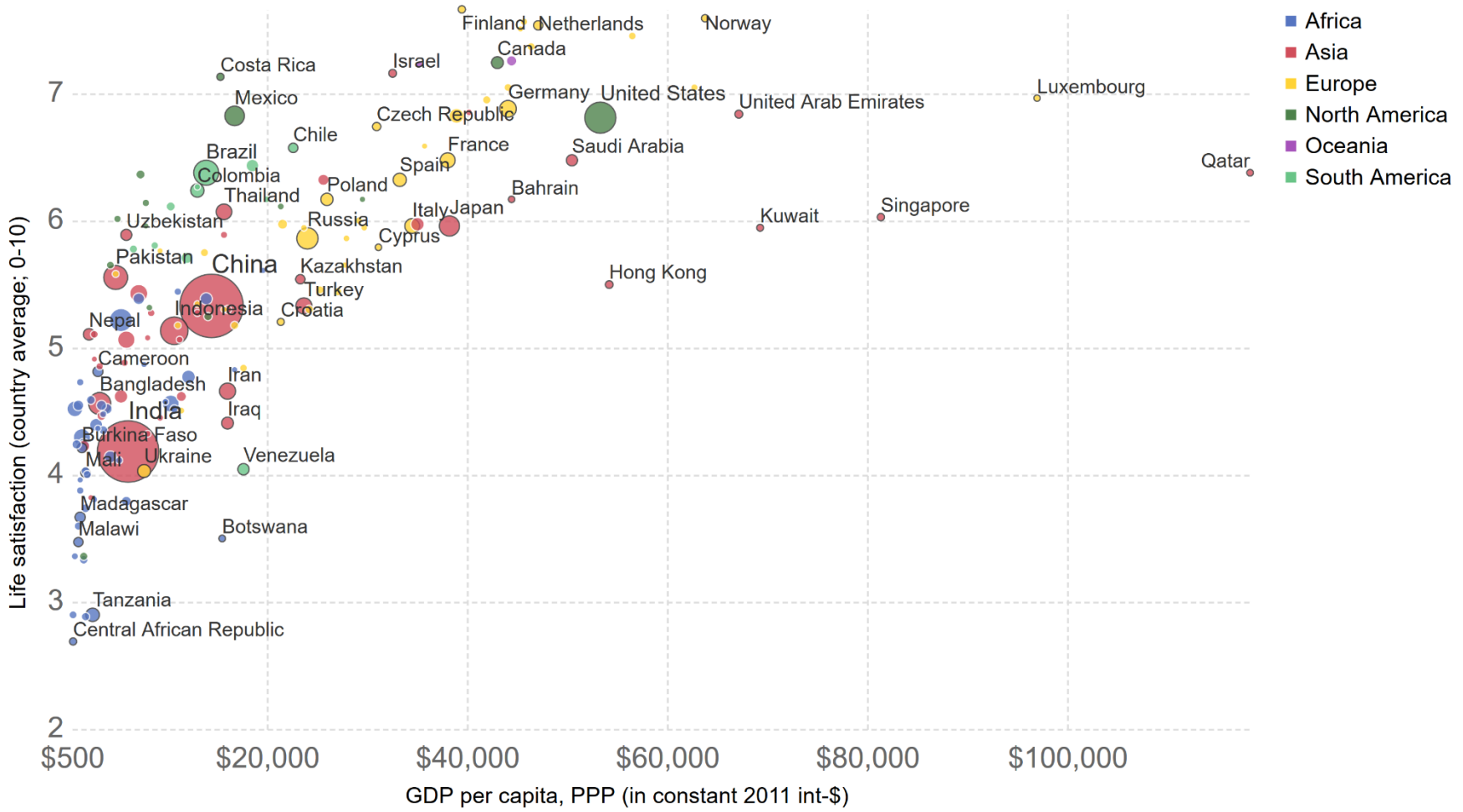


Gapminder.org

GDP and ‘Happiness’

GDP per capita vs Self-reported Life Satisfaction, 2016

Vertical axis shows national average self-reported life satisfaction in the Cantril Ladder (a scale ranging from 0-10 where 10 is the highest possible life satisfaction). Horizontal axis shows GDP per capita based on purchasing power parity (i.e. GDP per head after adjusting for inflation and cross-country price differences).



Source: World Bank – WDI, World Happiness Report (2017)

Agenda

1. Measuring production

2. Measuring the price level and inflation

- **The Price level and Inflation**
- **Indicator: Consumer Price Index (CPI)**
- **Using CPI to convert nominal to real**
- Problems with CPI
- Goal: Stable prices

3. Measuring unemployment and employment

The price level and inflation

In micro, look at prices of individual g&s

In macro, look at the **general price level**

Usually, the price level **rises** over time → we say the economy is experiencing **inflation**

Inflation rate = % change in price level per unit of time

- Most often used time unit is a year

Measuring the price level and inflation

The **GDP deflator** measures the price level of g&s included in GDP

But it is not suitable for measuring changes in households' **cost of living**

- Alternative 1: build a "Private Consumption Deflator"
  - Similar to GDP deflator, but applied only to C

- Alternative 2: build a **Consumer Price Index**

Indicator: Consumer Price Index (CPI)

Building the Consumer Price Index

1. Fix the market basket (a.k.a. CPI basket) of g&s that the average household consumes in a year
2. For each year, collect the prices of items in the market basket
3. Using the prices, compute the market basket's cost
4. Choose a base year and compute the CPI as follows:

$$\textbf{CPI current year} = 100 \times \frac{\textbf{Cost of market basket in current year}}{\textbf{Cost of market basket in base year}}$$

Computing CPI and inflation rate

Household's CPI basket = 10 pizzas, 20 cakes

Base year is chosen to be 2015

Year	Pizza	Cake	Cost of market basket
2015	$5	$5	$5x10 + $5x20 = $150
2016	$9	$6	$9x10 + $6x20 = $210

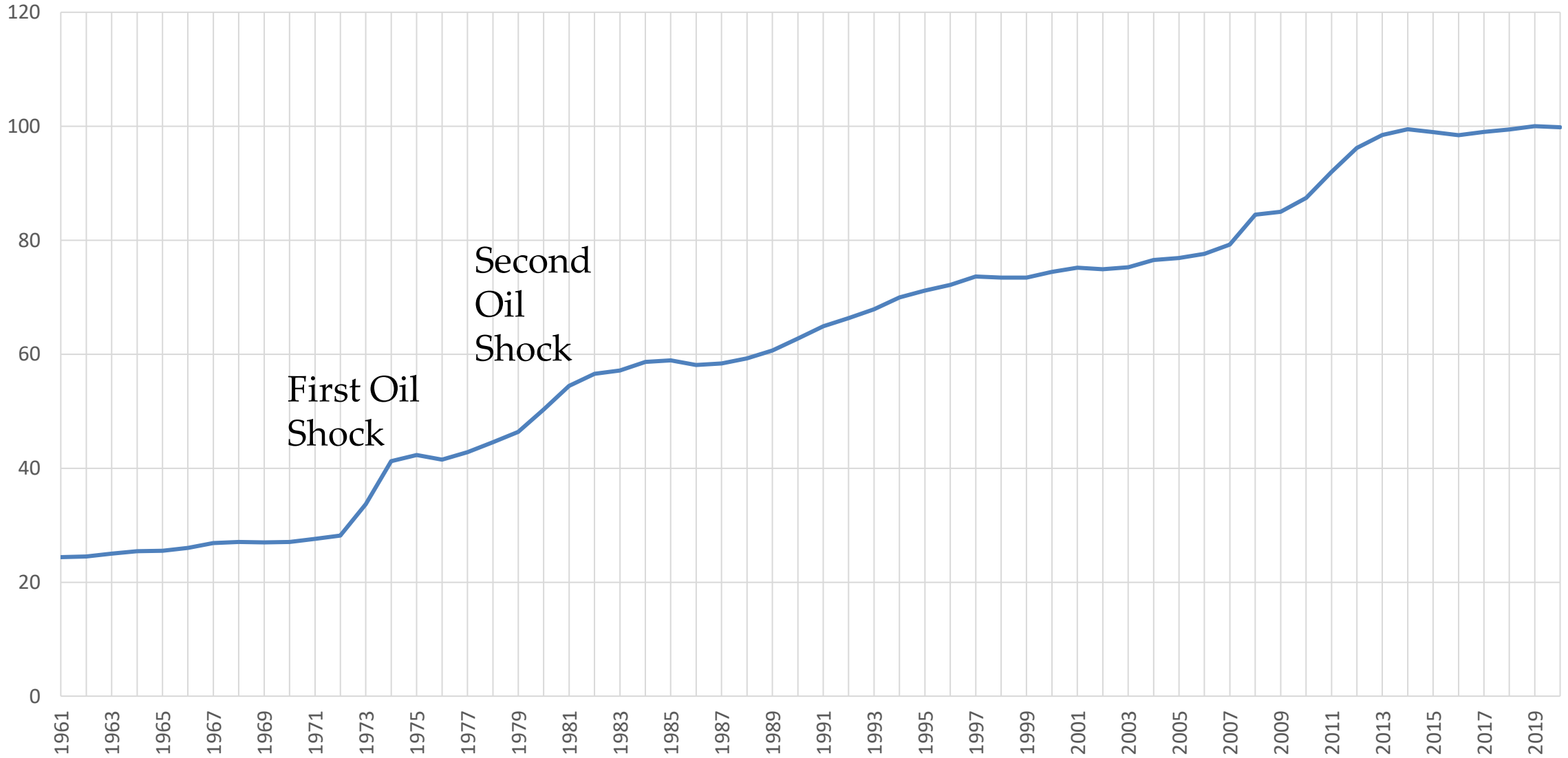
CPI 2015 = 100 x $150/$150 = 100

CPI 2016 = 100 x $210/$150 = 140

2016 Inflation rate = 40%

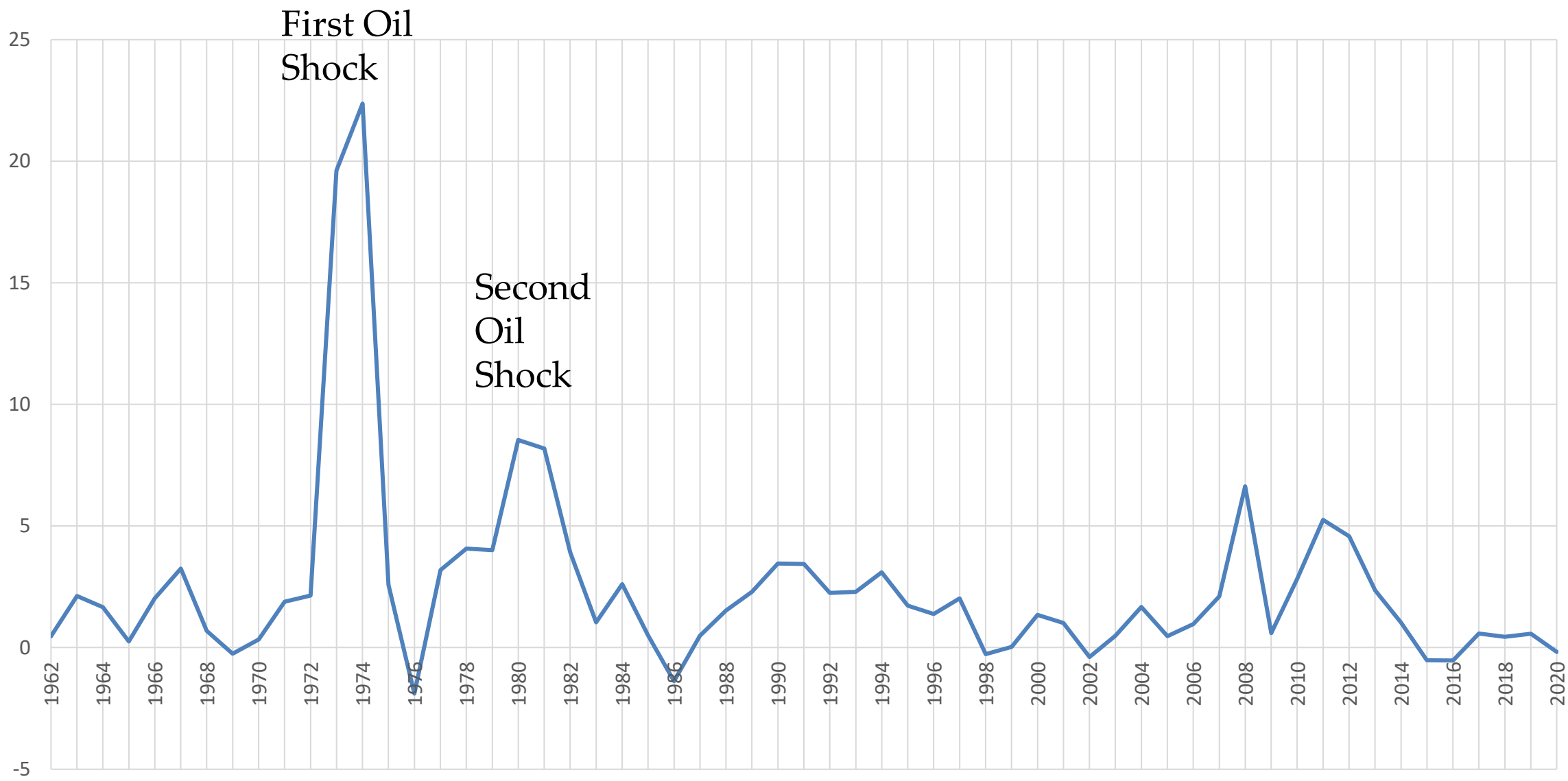
Convention: if not stated, assume per year

Singapore CPI 1961-2020 (2019 base year)



Source: Department of Statistics, Singapore

Singapore CPI inflation rate 1962-2020



Source: Department of Statistics, Singapore

Singapore: most expensive city 2018?

EIU City cost-of-living index, September 2018

The ten most expensive cities in the world

Country	City	WCOL index (New York=100)	Rank	Rank movement
Singapore	Singapore	107	1	0
France	Paris	107	1	1
China	Hong Kong	107	1	3
Switzerland	Zurich	106	4	-2
Switzerland	Geneva	101	5	1
Japan	Osaka	101	5	6
South Korea	Seoul	100	7	-1
Denmark	Copenhagen	100	7	1
US	New York	100	7	6
Israel	Tel Aviv	99	10	-1
US	Los Angeles	99	10	4

Source: The Economist Intelligence Unit (2019): *Worldwide Cost of Living 2019*

Singapore: most expensive city 2019?

EIU City cost-of-living index, September 2019

The ten most expensive cities in the world

Country	City	WCOL index (New York=100)	Rank	Rank movement
Singapore	Singapore	102	1	0
China	Hong Kong*	102	1	0
Japan	Osaka	102	1	4
US	New York	100	4	3
France	Paris	99	5	-4
Switzerland	Zurich	99	5	-1
Israel	Tel Aviv	97	7	3
US	Los Angeles	96	8	2
Japan	Tokyo	96	8	5
Switzerland	Geneva	95	10	-5

*Hong Kong Special Administrative Region (SAR) of the People's Republic of China

Source: The Economist Intelligence Unit (2020): *Worldwide Cost of Living 2020*

The Economist Intelligence Unit's Cost of Living Index

The EIU's Worldwide cost of living index is essentially a form of **CPI**

Basket of g&s = 160 items consumed by **expatriate households**

Comparison is **across cities** rather than across time

- New York City is chosen as **base city** (index value = 100)
- Cost of basket in other cities is **converted into US dollars** at prevailing exchange rate

Using CPI to convert nominal to real

Economic agents are usually more concerned with real values than nominal values

- E.g. if your **nominal wage** rises by 5%, but there is inflation, your **real wage** rises by less than 5%.

CPI can be used to convert nominal values into real values

$$\text{Real Value (in "base year dollars")} = \text{Nominal Value} \times \frac{100}{\text{CPI}}$$

Active Learning: Real Wages

A fresh graduate's starting annual salary is $20,000 in 1989, and $75,000 in 2019. The CPI was 40.0 in 1989 and 160.0 in 2019.

Q: In which of the two years does a fresh graduate have a higher real wage?

Real wage of 1989 fresh grad =

Real wage of 2019 fresh grad =

The _____ fresh grad has the higher real wage

Nominal Interest Rate

Jack lends Diane $10,000 in 2016

Diane promises to repay $10,500 in 2017

The difference $10,500 - $10,000 = $500 is called **interest**

Nominal interest rate = nominal interest per period as % of loan

= $500 / $10,000

= 5% (per year)

Convention: if not stated, assume per year

Real Interest Rate

Suppose CPI 2016 = 100 and CPI 2017 = 102

- 2017 inflation rate is thus 2% per year

Then 2017's $10,500 **in 2016 dollars** = $10,500 x 100/102

= $10,294

Thus, $10,294 –$10,000 = $294 is the **real interest**, **in 2016 dollars**

Real interest rate = real interest per period as % of loan

= $294 / $10,000

= 2.94%

Fisher equation: nominal and real interest rates

A useful approximation:

$$\text{Real Interest Rate} \approx \text{Nominal Interest Rate} - \text{Inflation Rate}$$

This is the **Fisher Equation**, named after economist Irving Fisher

In our example, nominal interest rate = 5% per year

CPI inflation rate = 2% per year

Thus, real interest rate ≈ 5% per year – 2% per year

= 3% per year

Agenda

1. Measuring production

2. Measuring the price level and inflation

- The Price level and Inflation
- Indicator: Consumer Price Index (CPI)
- Using CPI to convert nominal to real
- **Problems with CPI**
- **Goal: Stable prices**

3. Measuring unemployment and employment

Problems with CPI

Economists have argued that there are several types of **upward bias** in the way CPI is computed, namely

- **Substitution bias** and **Outlet bias**
- **Quality change bias** and **New goods bias**

Consequently, **the CPI-inflation rate overstates the actual inflation experience of consumers**

Substitution bias in CPI

Year	Pizza	Cake
2016	$5	$5
2017	$9	$6

In 2017, Pizza prices rose faster than cake prices

Households buy fewer pizzas and more cakes (i.e. they practice **substitution**)

But market basket (basis for CPI) is unchanged: 10 pizzas, 20 cakes

2017 CPI inflation rate will overstate the rise in cost of living

Active Learning: Substitution bias in CPI

Actual basket in 2016: 10 pizzas, 20 cakes

Actual basket in 2017: 6 pizzas, 24 cakes

Complete the table. Compute the % change in the actual cost of living

Year	Pizza	Cake	Cost of actual basket
2016	$5	$5	$5x10 + $5x20 = $150
2017	$9	$6	

% change in cost of actual basket 2017 = 100% x _____ / ____ = ____%

Recall: CPI inflation rate 2017 = 40%

Outlet bias

vs

As prices increase, consumers shift purchases from more expensive mainstream stores to cheaper **discount outlets and online retailers**

The latter may be less represented in statistical authorities' data collection

Quality change bias

This isn't inflation, just paying more for higher quality

But for most goods, adjustment for quality improvements is not done

2016 Donut
$10

2017 Donut
$11

New goods bias

New products tend to fall in price and improve in quality during the early years of the product's life cycle

They are added to the CPI market basket **only much later**

Thus, CPI fails to capture the fall in price during early years

Goal: Stable Prices

The goal of **stable prices** = the goal of keeping inflation **predictable, low, and positive**

Many governments delegate the task of attaining stable prices to their **central banks**

A common target is for a long-term inflation rate of **2% per year**

Inflation and redistribution of purchasing power

"Higher prices for thee = higher income for me!"

- Inflation does not destroy average purchasing power!

However, it can lead to **redistribution** of purchasing power!

Expected inflation can be incorporated into agreements ahead of time, thereby preventing unwanted redistribution of purchasing power

Predictability: Expected inflation is not a problem

E.g. Jack lends Diane $10,000 in 2016 for a year

Jack wants 3% real interest rate → he cares about **purchasing power**, not nominal values

Suppose the **expected inflation rate** is 2%

- They can agree to have Diane pays a nominal interest rate of 5%
- From the Fisher Equation, the **expected real interest rate** = 3%

Predictability: Unexpected Inflation redistributes

Suppose actual inflation rate is 4% i.e. **higher than expected**

Then, the actual real interest rate is **lower than expected**

- Jack *receives* less real interest than expected → worse off
- Diane *pays* less real interest than expected → better off

Unexpected inflation **redistributes purchasing power**

<u>Keeping inflation predictable</u> reduces unintended redistribution of purchasing power

Indexation to correct for inflation

A number is **indexed to inflation** if it is automatically corrected for inflation

E.g. Jack and Diane can make a loan agreement where the nominal interest rate is **3% + CPI inflation rate**, whatever the latter turns out to be

- If CPI inflation rate is 2%, nominal interest rate becomes 5%
- If CPI inflation rate is 4%, nominal interest rate becomes 7%
- Thus, the real interest rate is guaranteed to be 3%

High inflation is costly to society

As firms don't change prices at the same time, high inflation can **distort relative price signals**, causing misallocation of resources

High inflation also prompts people to use up valuable resources and time to cope with it

- Sellers change prices more often, incurring more **menu costs**
- Costs associated with minimizing money holdings (**shoe leather costs**)
- These costs are extremely apparent with ultra-high inflation rate (**hyperinflation**) episodes – more on this in Macro 4

Deflation is costly to society

Deflation = a prolonged spell of negative inflation

Deflation can make downturns and recessions worse

- In anticipation of lower future prices, households and firms may **postpone** their purchases
- Borrowers' incomes fall but their debts and interest may not → **loan defaults** and **bankruptcy declarations** increase, and economic activity is disrupted

Thus, aim for a predictable, low, but positive inflation rate!

Agenda

1. Measuring production

2. Measuring the price level and inflation

3. Measuring unemployment and employment

- **Goal: Low unemployment**
- **Indicator: Unemployment rate**
- **Types of unemployment**
- Other labour utilization indicators

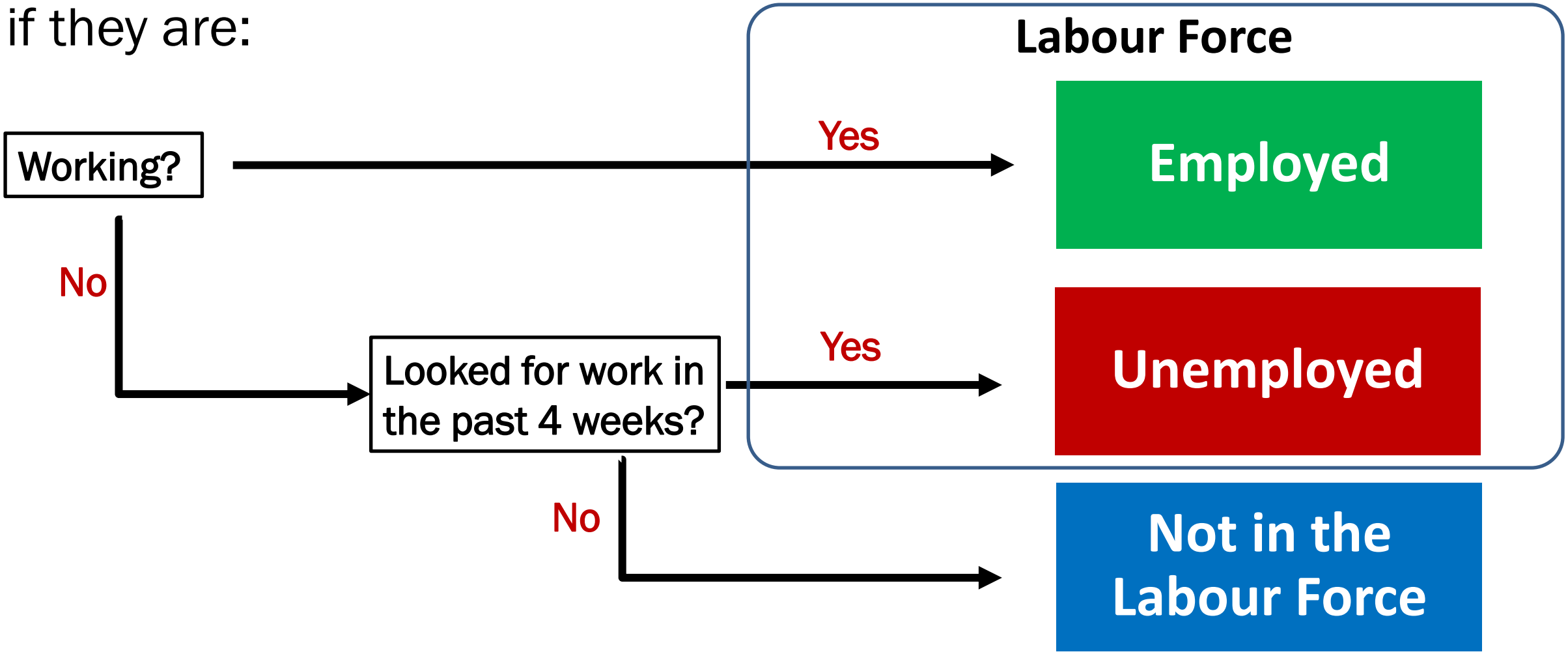
Goal: Low unemployment

Having large numbers of people unable to find work is very costly to society

- Labour resources are unutilized
- Skills of workers erode with non-use
- Health, social and political problems increase

Indicator: Unemployment rate

In monthly or quarterly surveys, ask those who are **able to work** if they are:



USA labour utilization August 2018

Able to Work = “Civilian and non-institutionalized, age 16+”

258.1 million

Employed

155.5 million

Unemployed

6.3 million

Not in the Labour Force

96.3 million

Labour Force 161.8 million

Source: US Bureau of Labor Statistics 2018

The Unemployment Rate

The **Unemployment Rate** is the percentage of the labour force that is unemployed

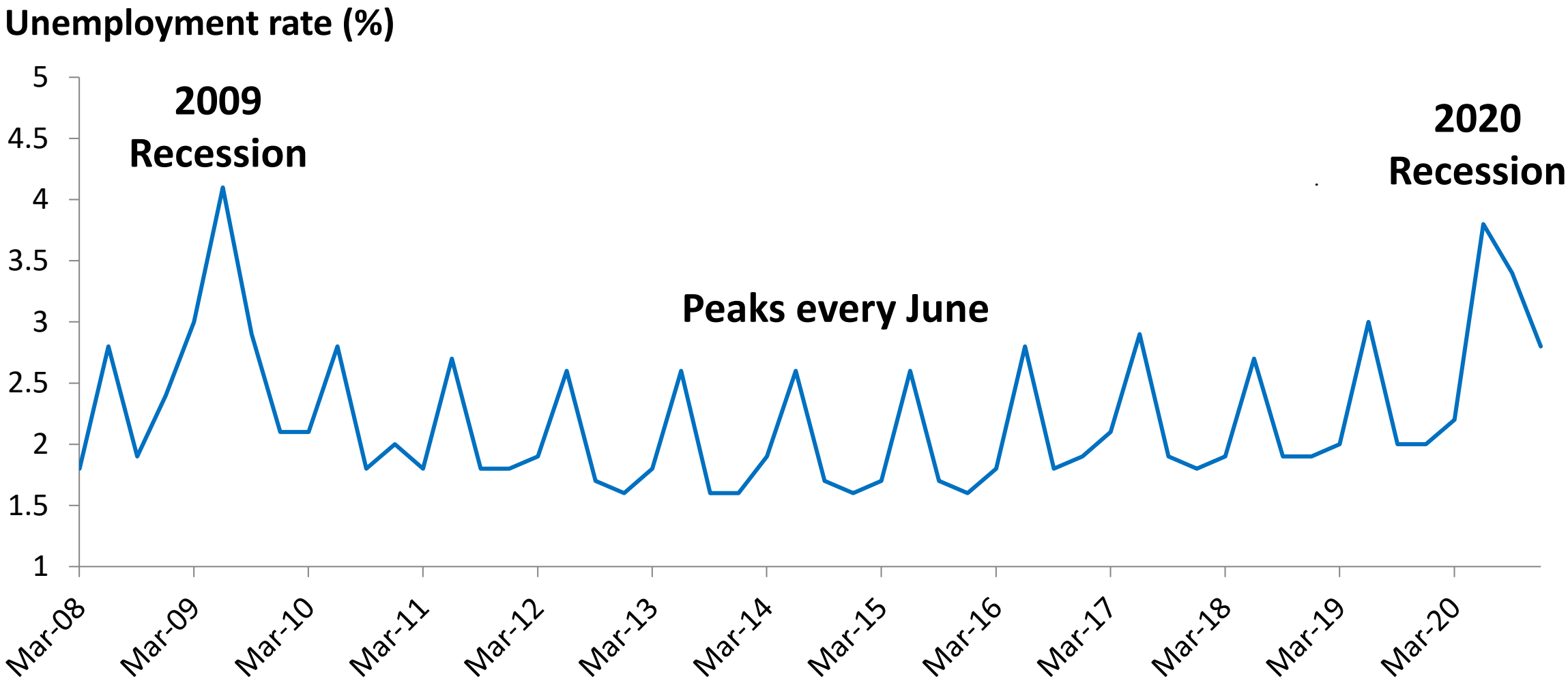
Employed	Unemployed	Labour Force
155.5m	6.3m	155.5m + 6.3m = 161.8m

$$\text{Unemployment Rate} = 100\% \times \frac{\text{Unemployed}}{\text{Labour Force}}$$

$$= 100\% \times \frac{6.3\text{m}}{161.8\text{m}}$$

$$= 3.9\%$$

Singapore unemployment rate 2008-2020



Source: Singapore Department of Statistics

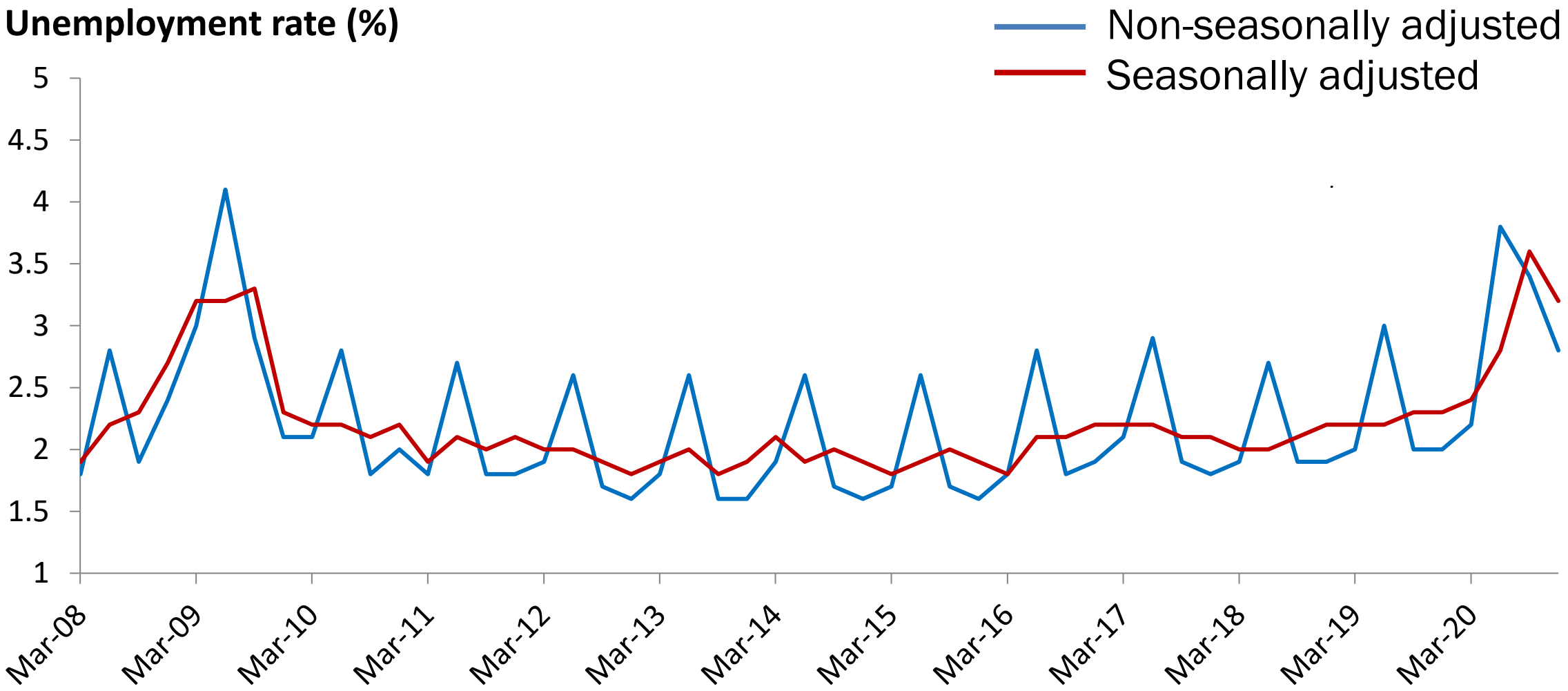
Seasonality in Unemployment

Unemployment is often **seasonal** i.e. related to seasonal changes in weather, tourist patterns, etc.

- Short term
- Entirely predictable

Data that exhibits seasonal variation are often **seasonally adjusted**, i.e. modified to remove the seasonal variation to facilitate comparisons

Singapore seasonally adjusted unemployment rate 2008-2020



Source: Singapore Department of Statistics

Types of Unemployment

Economists classify unemployment into 3 main types

Frictional

Structural

Cyclical

Different types of unemployment warrant different policy responses

Frictional Unemployment

Frictional unemployment = those in between jobs or just entering labour market

- Looking for good matches
- Short term
- Generally painless

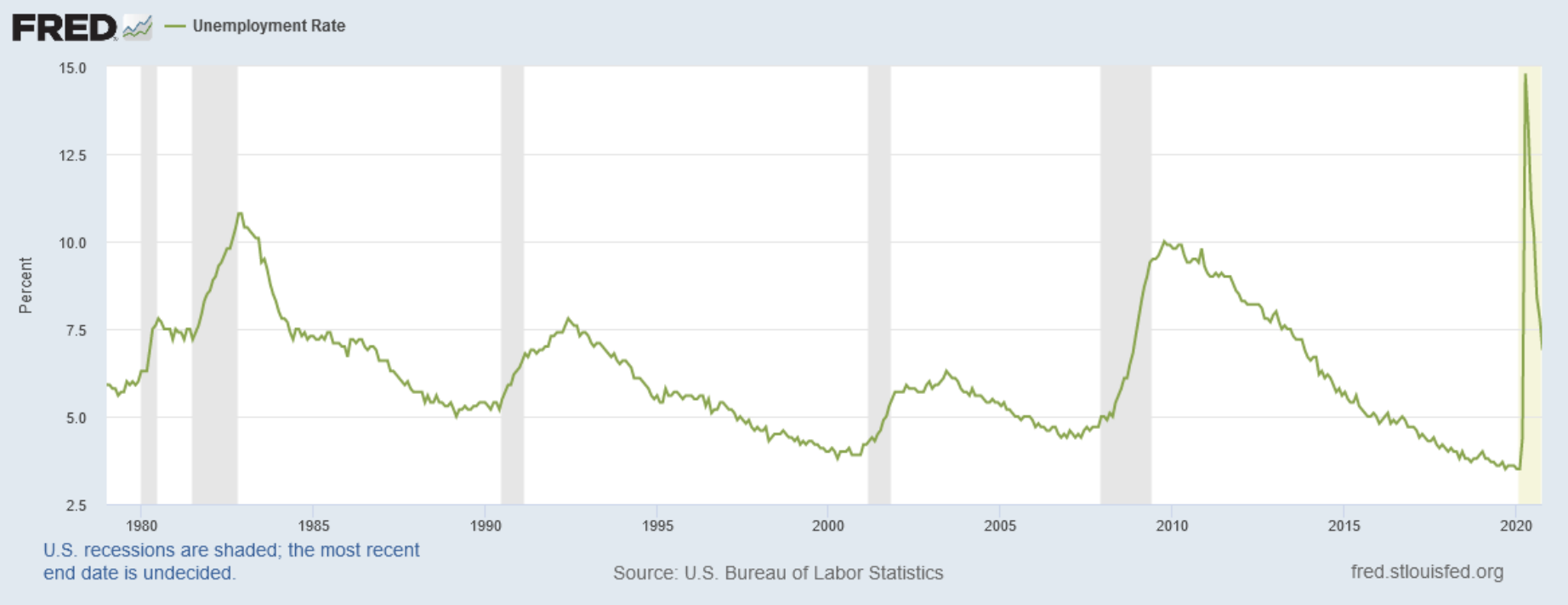
Workers may extend their job search time if the government provides **unemployment insurance** i.e. cash transfers to the unemployed

Structural Unemployment

Structural Unemployment is caused by structural factors, e.g.

Skill mismatch	Geographic mismatch	Labour market impediments
• Mismatch between **workers' skills and employers' requirements**	• Mismatch between workers' and employers' **locations**	• high minimum wage, discrimination, unionization, etc.

Cyclical Unemployment



Unemployment rate tends to **rise during recessions**, and **fall in between recessions**

Cyclical Unemployment refers to the fluctuations in unemployment that arises from changes in production over the **business cycle**

Meaning of "Full Employment"

"Full employment" does not mean there is zero unemployment

Instead, it refers to zero cyclical unemployment

- The other types of unemployment are present
- At full employment, the output the economy produces is called its Potential Output

Macroeconomists use models and data to estimate the "natural" u-rate = u-rate when the economy is at full employment

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- Goal: Low unemployment
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- Types of unemployment
- **Other labour utilization indicators**

Other Labour Utilization indicators

Statistical authorities produce other indicators to get a more complete picture of the labour market

Labour force participation rate	Employment rate	Modified U-rates

Labour Force Participation Rate

The **Labour Force Participation Rate** is the percentage of those "able to work" who decide to join the labour market

Able to work	Labour Force
258.1m	161.8m

Labour Force Participation Rate $= 100\% \times \frac{\text{Labour Force}}{\text{Able to work}}$

$= 100\% \times \frac{161.8\text{m}}{258.1\text{m}} = 62.7\%$

Employment Rate

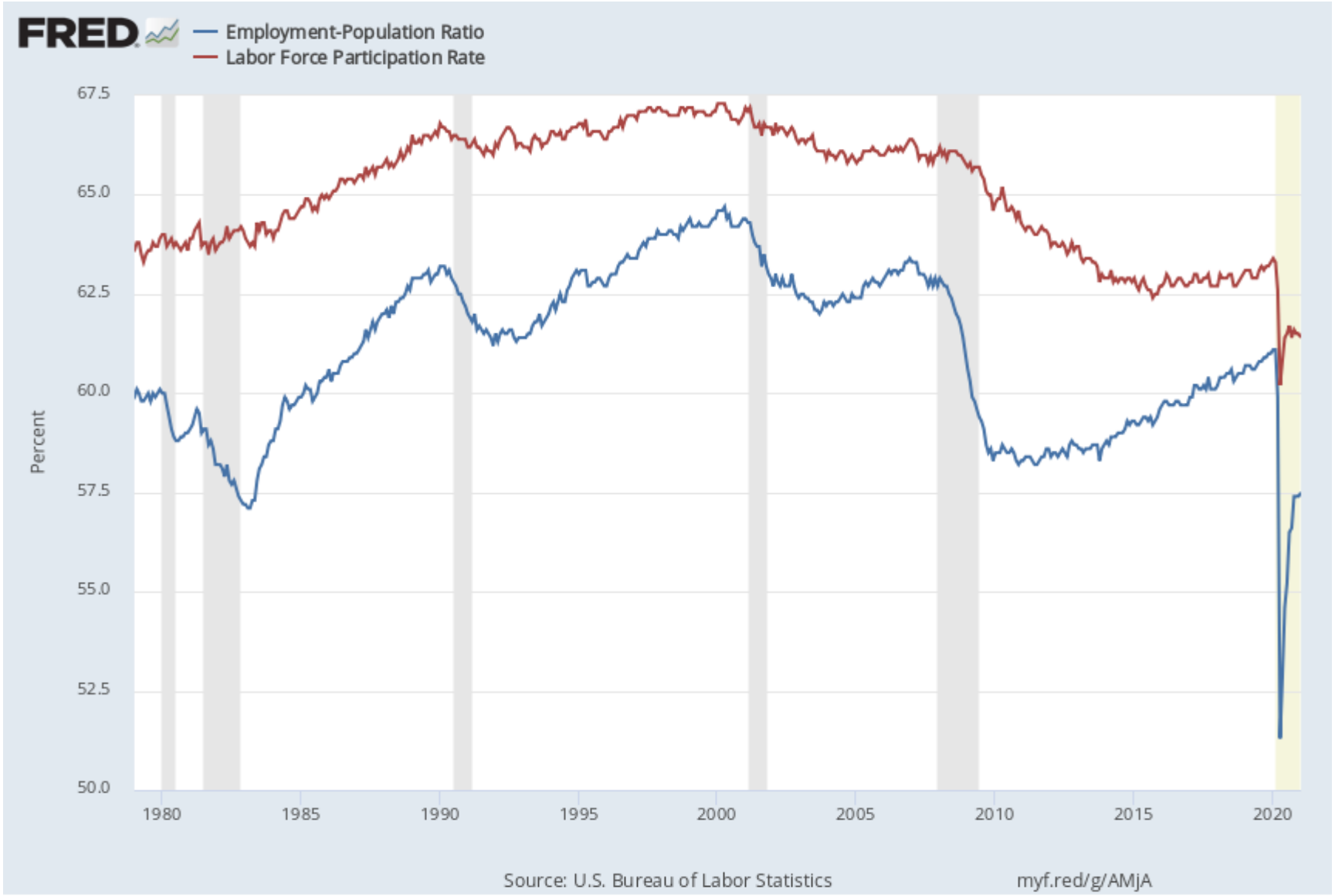
The **Employment Rate** is the percentage of those "able to work" who are employed

Able to work	Employed
258.1m	155.5m

$$\text{Employment Rate} = 100\% \times \frac{\text{Employed}}{\text{Able to work}}$$

$$= 100\% \times \frac{155.5\text{m}}{258.1\text{m}} = 60.3\%$$

US participation rates and employment rates



Participation rates and employment rates never fully recovered to 2008 levels

, and have plummeted due to Covid-19

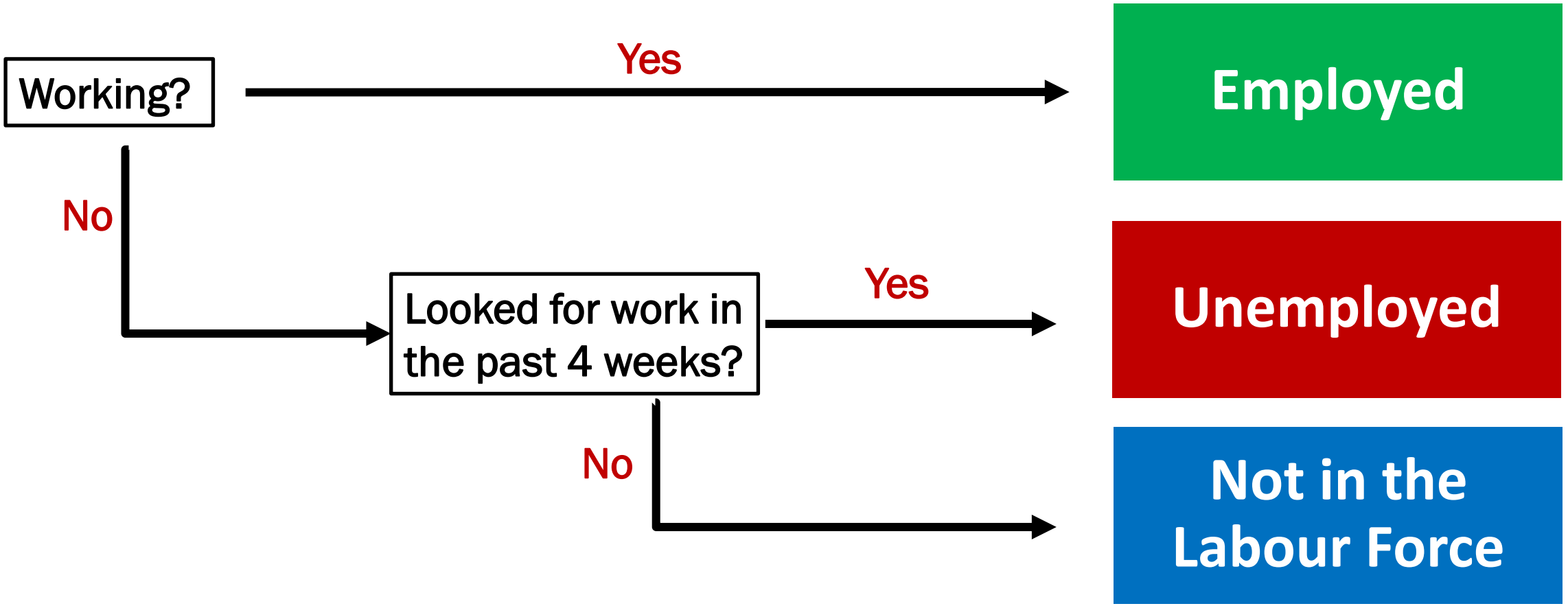
Active Learning: Limitations of the Unemployment Rate

In each of the following, what happens to the u-rate?

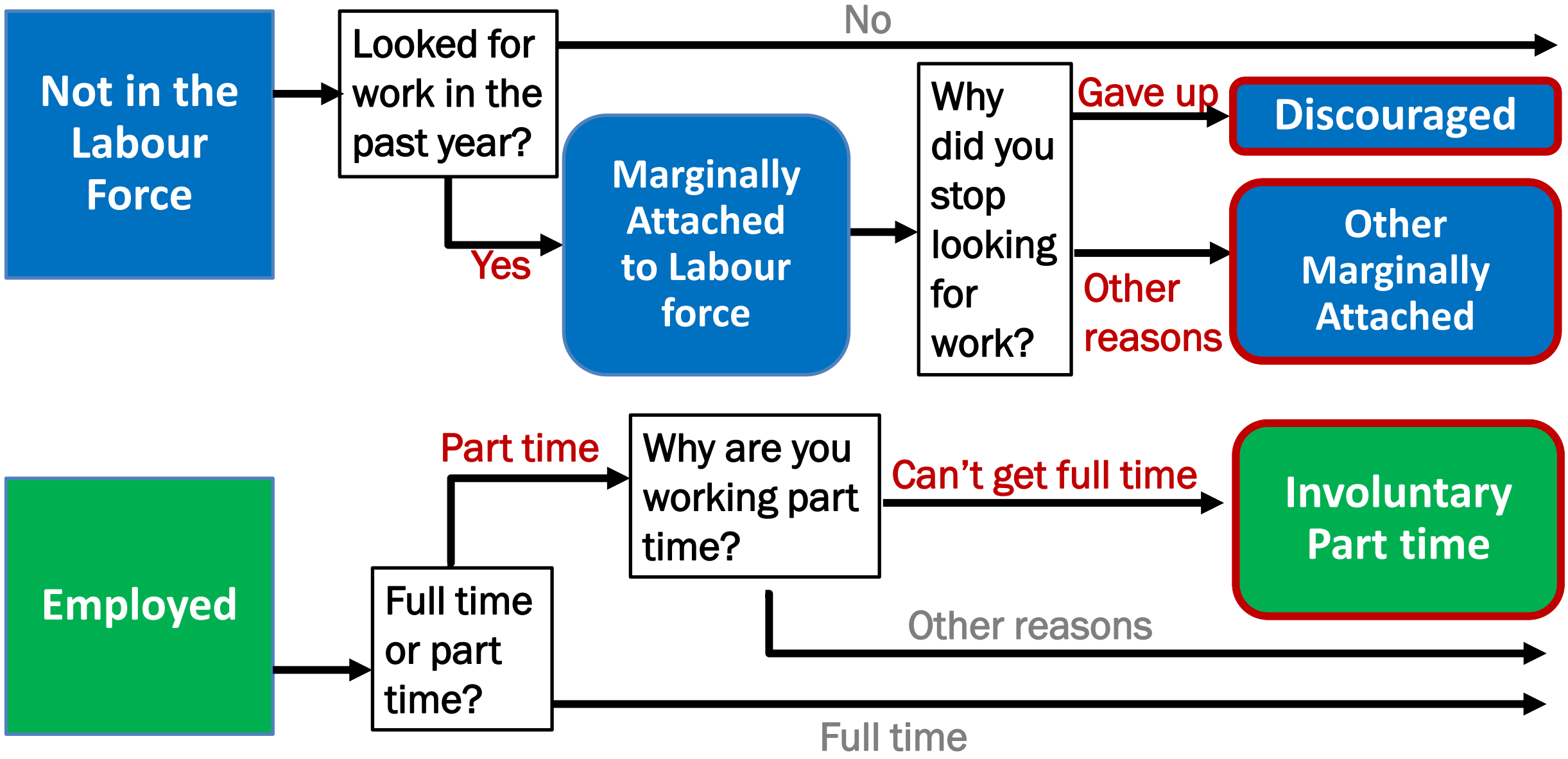
	Case 1: Tan	Case 2: Amanda	Case 3: Ganesh
Description	After six months of unsuccessful job search, Tan is discouraged and decides to stop looking for work.	After six months of unsuccessful job search, Amanda has decided to stay home to take care of her two children. She's no longer actively looking for work, but would work if the opportunity arises.	Ganesh lost his job as a research scientist at NUS two weeks ago. Since then he drives part-time for Grab, but continues to look for a full time position in universities.
Effect on U-rate			

Ask more questions in the survey (I)

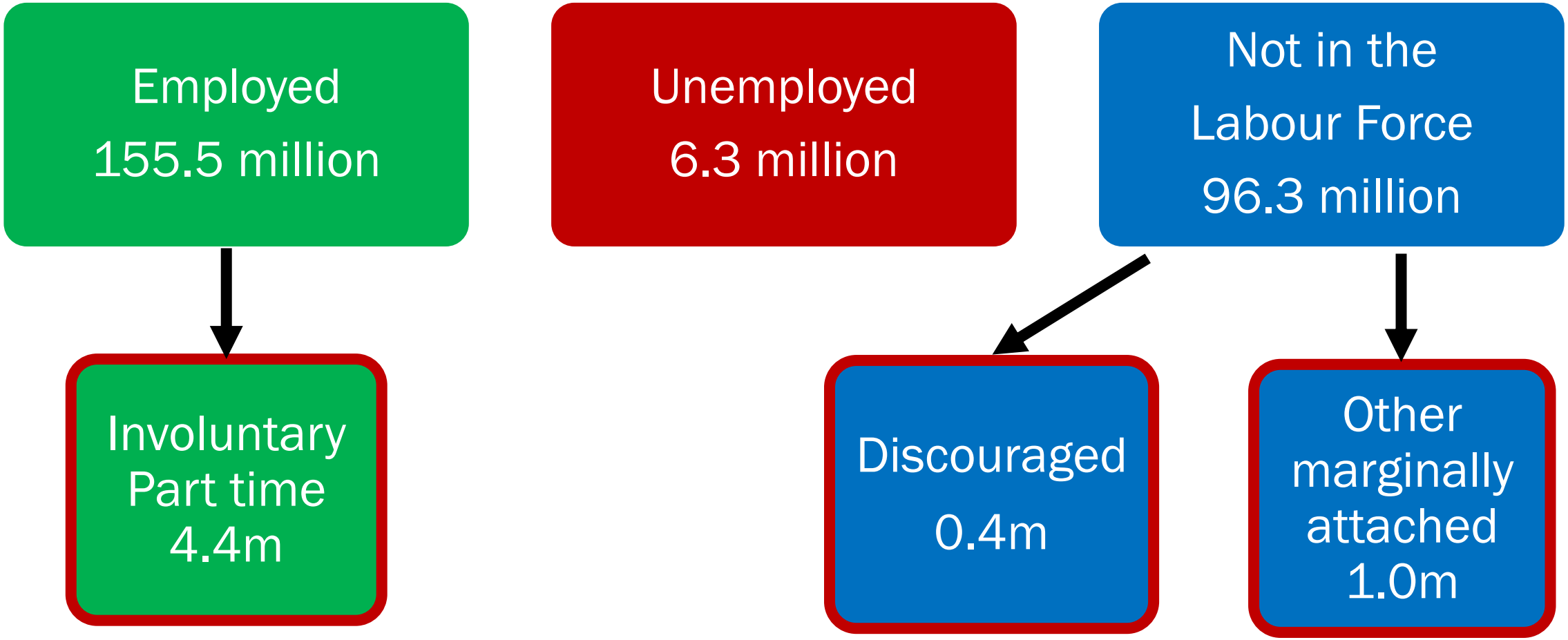
Ask more questions to those **not in the labour force**, and those who are **employed**



Ask more questions in the survey (II)



USA labour utilization August 2018 revisited



Source: [US Bureau of Labor Statistics 2018]

Modified U-rates

A	Employed	155.5m
B	Unemployed	6.3m
C	Discouraged	0.4m
D	Other marginally attached	1.0m
E	Involuntary part time	4.4m

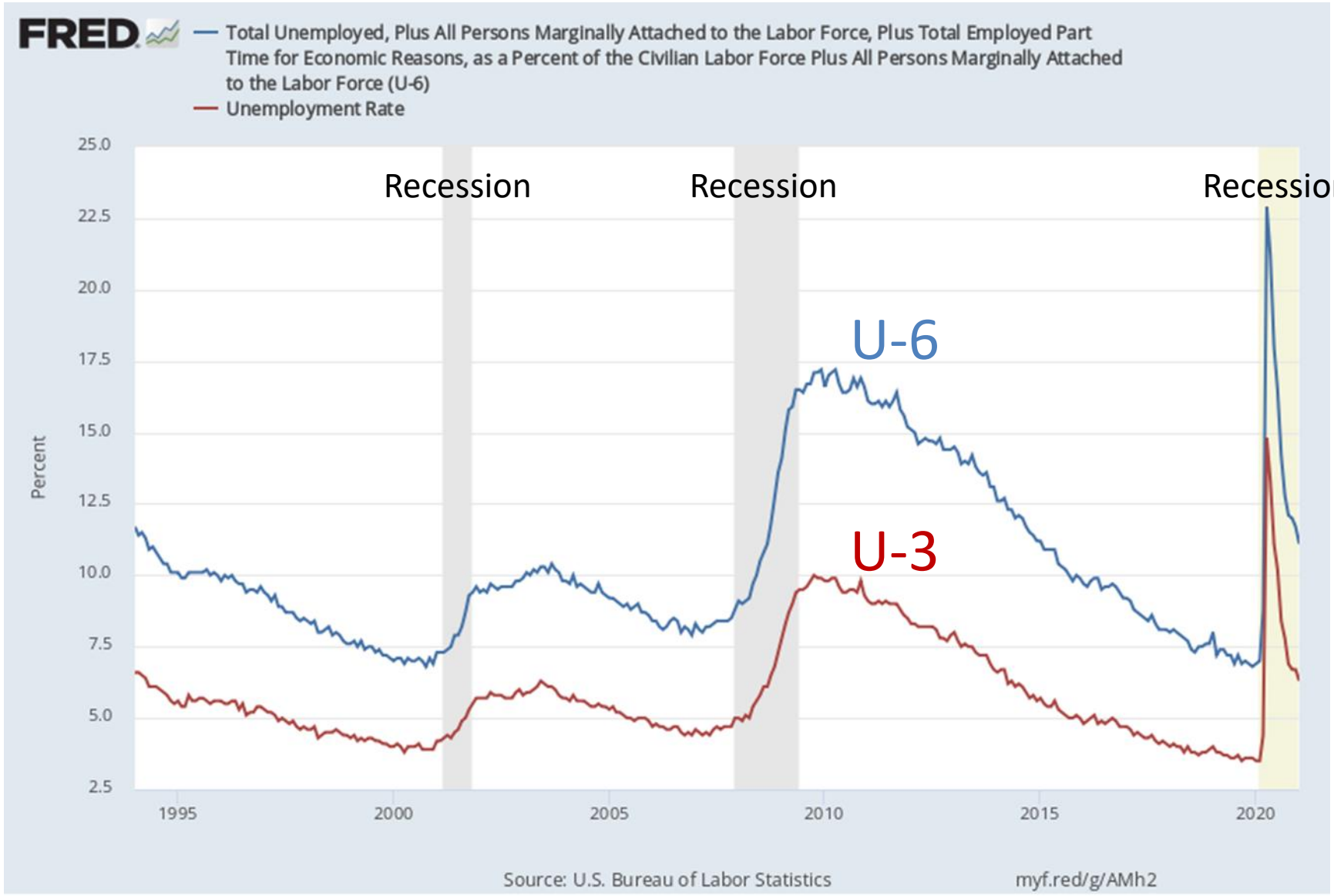
U-Rate (U-3) $= \dfrac{B}{A + B} = 3.9\%$

U-4 $= \dfrac{B + C}{A + B + C} = 4.1\%$

U-5 $= \dfrac{B + C + D}{A + B + C + D} = 4.7\%$

U-6 $= \dfrac{B + C + D + E}{A + B + C + D} = 7.4\%$

USA U-3 and U-6, 1994-2020



Note how U-6 rises much more rapidly than U-3 in the last two recessions