

The US Macroeconomy in Data

Public working draft - PDF snapshot 2026-08-21 (v1)

Simon Halliday and collaborators

2026-08-21

Table of contents

Learning objectives	2
1.1 Three generations in the US economy	2
Reading the opening evidence one step at a time	4
Final figure	4
Questions	5
Exercise	5
1.2 Reading a macroeconomic dashboard	5
Reading the unemployment figure one step at a time	6
Final figure	7
Everyday Economics 1.1	7
Questions	8
Exercise	8
1.3 Growth and living standards	8
Everyday Economics 1.2	9
Questions	9
Exercise	9
1.4 Jobs, unemployment, and participation	9
Questions	10
Exercise	11
Why add two more measures?	11
Build the figure one measure at a time	12
Final figure	12
Read the FRED metadata	12
Your investigation	13
Questions	13
Exercise	13
1.5 Inflation and the cost of living	14
Reading Figure 1.4 one step at a time	14
Final figure	14
Everyday Economics 1.3	15
Questions	15
Exercise	16
1.6 Recessions, crises, and recoveries	16
Questions	17

Exercise	17
1.7 Productivity, earnings, inequality, and government	17
Reading Figure 1.5 one step at a time	18
Final figure	18
Questions	19
Exercise	19
1.8 What the dashboard reveals—and what it hides	19
Questions to carry into the book	20
Questions	20
Exercise	20
Seeing the principles in action	20
Skills and learning objectives	21
Concepts to learn	22
Glossary	22
Chapter 1 terms	22
Flashcards	24
References	26
Answers to Questions	26

 Public working draft

Public working draft: This is an AI-assisted chapter skeleton for coauthor revision, not an approved manuscript. It deliberately mixes developed passages, drafting bullets, provisional figures, and visible review flags. The named Google Doc remains canonical during drafting. Publication on this site means “open for review,” not “fact-checked” or “data-manager approved.”

Learning objectives

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

1. distinguish a level, a change, a growth rate, a percentage, and an index number;
2. interpret output, employment, unemployment, participation, inflation, productivity, and real-earnings measures using their definitions and denominators;
3. identify how aggregation and classification affect a macroeconomic statistic;
4. use FRED metadata to document a series and distinguish an observation from a causal claim;
5. explain why an economy can grow while the economic experiences of many households remain insecure; and
6. formulate questions about a graph that later chapters can answer with models and additional evidence.

1.1 Three generations in the US economy

Imagine three people entering adulthood at three different moments in the US economy. They are composites, not real individuals, but the questions they face are familiar.

- **A grandparent enters the workforce in the long postwar expansion.** Production per person is rising and manufacturing still provides a large share of well-paid jobs for workers without

a four-year degree. Prices also rise, sometimes slowly and sometimes quickly. A job may feel secure, but access to many occupations, neighborhoods, and sources of credit is sharply unequal.

- **A parent finishes school during the Great Recession.** Employers are cutting jobs, unemployment is high, and graduating into a weak labor market can affect wages and opportunities for years. Housing prices have fallen in many places, but a cheaper house does not help much if a household cannot obtain a mortgage or is worried about losing income.
- **A student begins work during the pandemic and its recovery.** Employment collapses with unusual speed and then returns. Work, school, care, and shopping change abruptly. Prices later rise much faster than they had for decades. Some workers gain bargaining power or new flexibility; others face illness, unstable hours, or a widening gap between the prices they pay and the incomes they receive.

One long-run pattern connects all three generations. Economists often summarize it using **real GDP per capita**¹: **real gross domestic product**² divided by the population. This inflation-adjusted measure of production per person has risen substantially, but the line has not risen smoothly and the average does not tell us how the gains were shared. It is the first piece of evidence in the chapter—not a verdict that living standards rose equally for everyone.

¹Real GDP per capita measures the inflation-adjusted value of final goods and services produced within a country, divided by its population. It is an average of domestic production—not household income, a description of its distribution, or a complete measure of well-being. See also: real gross domestic product.

²Real gross domestic product measures domestic production after removing the effect of changes in the overall price level. It is a total for the economy; dividing it by the population produces real GDP per capita. See also: real GDP per capita; price level.

Reading the opening evidence one step at a time

Final figure

US real GDP per person has risen over the long run

Quarterly, seasonally adjusted annual rate

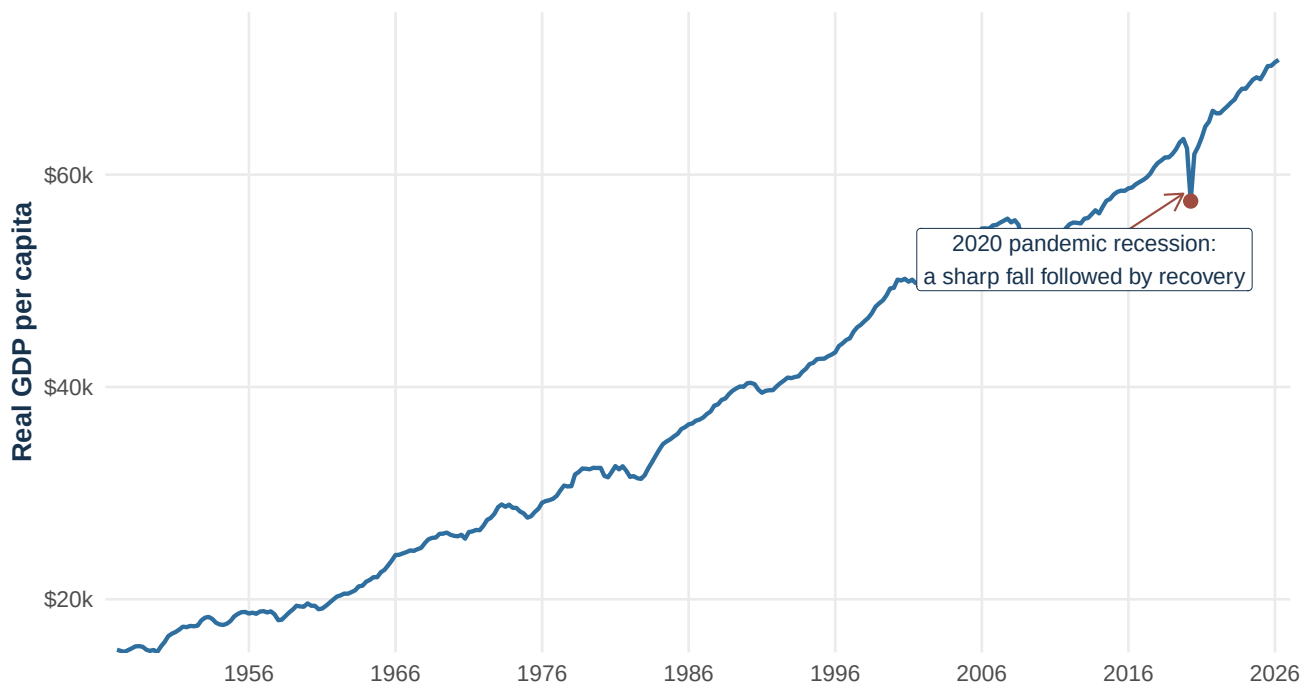


Figure 1: US real GDP per capita, 1947–2026. Chained 2017 dollars per person at a seasonally adjusted annual rate. Source: U.S. Bureau of Economic Analysis via FRED, series A939RX0Q048SBEA. Draft vintage accessed August 21, 2026.



Scan to open the live step-by-step figure, or use the linked figure title in the digital chapter.

What “chained 2017 dollars” means and how the series is constructed.

Only the final step annotates the 2020 episode. As in *The Economy 2.0*, the note directs attention to a date and a pattern; it does not make the annotation itself evidence of causation.

Each person might ask the same questions:

- Can I find work, and how secure will that work be?
- Will my pay rise faster than the prices of the things I buy?
- Can I afford housing, healthcare, education, and time away from paid work?
- Who sets the rules that shape my options?
- If the economy is said to be “doing well,” does that describe people like me?

Macroeconomics³ studies the economy as a whole. The move from one household or one market to the whole economy requires **aggregation**⁴: combining many people, firms, goods, prices, and transactions into totals or averages. Aggregation is necessary, but it compresses information. A national average can rise even when many people are worse off. A low unemployment rate can coexist with people leaving the labor force. A lower inflation rate means prices are rising more slowly; it does not mean the price level has returned to where it was.

This chapter starts with the measurements. Later chapters develop mechanisms that can explain them. That order matters. A graph may show *what changed* without establishing *why it changed*.

i Principle: Interdependence

The interdependence principle tells us that a household's possibilities depend on decisions and events elsewhere: employers' hiring, other workers' job searches, the banking system, government policy, technological change, and developments in other countries. The macroeconomy is a system of interacting parts, not a collection of isolated choices.

i Draft source and reuse note

Draft source and reuse note. The problem-first opening and the emphasis on how jobs and real wages shape family fortunes adapt the approach of [The Economy 2.0: Macroeconomics, Section 1.1](#). The three US composites are new drafting scaffolds and need coauthor development, historical sourcing, and sensitivity review.

Questions

Question 1.1. What is the main reason economists aggregate individual activity into macroeconomic statistics?

A. To eliminate differences among households B. To construct economy-wide totals, rates, and averages C. To prove which policies caused an outcome D. To ensure every household is represented by the average

Exercise

Reading an aggregate claim

A headline says, "The economy grew, so Americans became better off." Identify one aggregate measure that could support part of the headline, then identify two kinds of household-level information you would need before accepting the full claim.

1.2 Reading a macroeconomic dashboard

A dashboard does not answer every question. It gives us a disciplined place to begin. Before interpreting any graph, identify:

³Macroeconomics uses totals and averages such as aggregate output, employment, unemployment, and prices, while also studying feedback among households, firms, government, and other economies.

⁴Aggregation makes macroeconomic measurement possible but can conceal differences among groups and can introduce feedback that is not visible when one actor is considered alone.

1. **Variable:** What is being measured?
2. **Population and denominator:** Who or what is included, and what is the total against which the measure is compared?
3. **Units:** Dollars, people, percent, percentage points, an index, or a growth rate?
4. **Frequency:** Monthly, quarterly, or annual?
5. **Adjustment:** Is the series seasonally adjusted? Is a dollar series nominal or real?
6. **Time period and data vintage**⁵: Which observations are shown, and when were they downloaded or revised?
7. **Source:** Which agency produced the measure, and how does it define it?

Consider unemployment. In July 2026, the headline US **unemployment rate**⁶ was 4.1% in the pinned series used for Figure 2. That compact number depends on several classifications. Who counts as employed? Who has no job but is actively searching? Who is outside the measured labor force?

The unemployment rate divides the number of unemployed people by the labor force. It does not divide by the entire adult population. A person who wants a job but has stopped actively searching may therefore disappear from both the numerator and the denominator.

Reading the unemployment figure one step at a time

The final figure and every step below are produced by the same R script from the same pinned data. The steps change what the student is asked to notice; they do not silently substitute a different dataset.

⁵The version of a dataset available on a particular date, including any revisions known at that time.

⁶The headline unemployment rate divides the number of unemployed people by the labor force, not by the full working-age population. Its interpretation therefore depends on employment, active search, and labor-force classifications. See also: labor force; labor force participation rate; employment-population ratio.

Final figure

US unemployment rose sharply in 2020

Monthly, seasonally adjusted

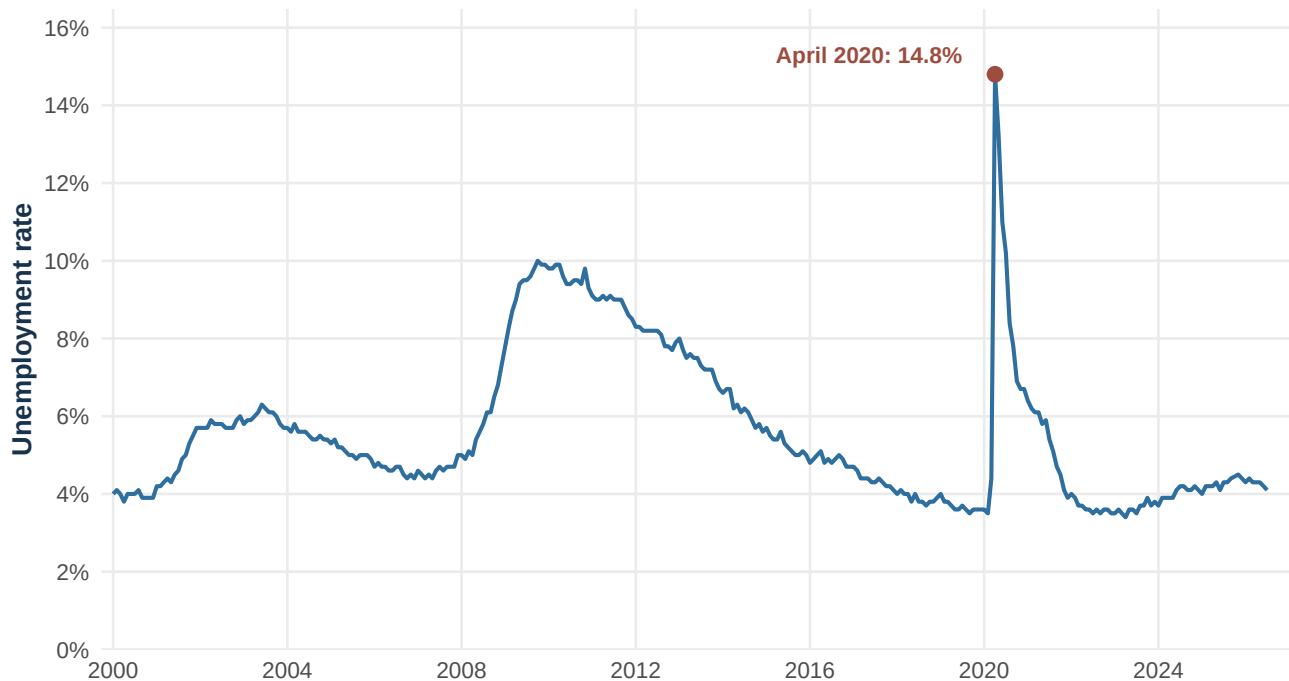


Figure 2: US unemployment rate, January 2000–July 2026. Source: U.S. Bureau of Labor Statistics via FRED. Pinned draft data vintage accessed August 21, 2026.



Scan to open the live step-by-step figure, or use the linked figure title in the digital chapter.

The final figure marks the April 2020 value. Annotation directs attention; it does not add causal evidence. To explain the spike, we would need institutional knowledge, other data, and a model of how a public-health emergency and policy responses affected work and hiring.

i Side note

Everyday Economics 1.1

What can one graph tell us?

Suppose a news story uses Figure 2 to claim that a particular policy caused unemployment to fall. What additional comparison or evidence would you want? Write one sentence the figure supports and one causal sentence it does not support by itself.

⚠ Review flag

Note for fact checkers: Verify the July 2026 value, the treatment of temporary pandemic layoffs in the Current Population Survey, and the language describing active search against the [BLS](#)

labor-force definitions. Figure source: [FRED series UNRATE](#). Status: source linked; detailed check pending.

Questions

Question 1.2. Before interpreting a time-series graph, which information is most important to identify?

A. Only the title and the final observation B. The variable, denominator, units, frequency, adjustment, period or vintage, and source C. Whether the line rises more often than it falls D. The policy preferred by the person who made the graph

Exercise

Audit a headline statistic

Choose Figure 1.1. Record its variable, denominator, units, frequency, seasonal adjustment, period, data vintage, and source. Then write one descriptive claim the figure supports and one causal claim it cannot establish by itself.

1.3 Growth and living standards

The opening Figure 1 shows real GDP per capita over time. Real GDP measures the inflation-adjusted value of final goods and services produced within the United States over a stated period. Dividing by population turns the economy-wide total into an average per person; it does not turn that average into anyone's actual income. We now return to that evidence to separate the level from its rate of change, a total from a per-person measure, and an average from a distribution.

Three distinctions prevent common mistakes.

- **Level versus growth rate.** The height of the line is the level of real GDP per person. The steepness indicates how quickly it is changing. A recession can reduce the level for a time without erasing decades of earlier growth.
- **Total versus per person.** Total output can rise because the population grows. Dividing by population gives an average per person, which is more informative about potential living standards.
- **Average versus distribution.** GDP per person is not the income of a typical household. It can rise while gains accrue mainly to a small group, while unpaid work increases, or while environmental quality declines.

Rising output per person expands the set of goods and services a society could make available. It does not tell us which goods are produced, how they are distributed, how much free time people have, or whether production damages the physical environment. This is why the UOE Micro discussion of transformed living standards pairs GDP per person with measures of health, education, inequality, and environmental conditions.

i Side note

Everyday Economics 1.2

A richer economy and an unaffordable apartment

A graduating student may hear that real GDP per person is near a record high while finding rent unaffordable. These claims are not contradictory. One is an average measure of production; the other depends on local housing supply, the student's income and wealth, credit conditions, household size, and the rules governing land use and housing.

i Draft source and reuse note

Draft source and reuse note. The distinctions between totals, averages, well-being, and distribution adapt material and sequencing from [UOE Micro, Chapter 3](#) and the discussion of aggregate measurement in [The Economy 2.0: Macroeconomics, Section 1.3](#). Chapter 5 will provide the full GDP accounting treatment; Chapter 1 should remain descriptive.

Questions

Question 1.3. Figure 1.1 shows US real GDP per person rising over most of the postwar period. Which statement best interprets the figure?

A. Every US household's real income rose in every quarter B. The inflation rate rose because the level of real GDP per person rose C. Average inflation-adjusted domestic production per person rose substantially over the long run D. The US population must have fallen

Question 1.4. Mean income rises while median income falls. Which conclusion is justified?

A. Every household received an income gain B. The income distribution must be unchanged C. Large gains near the top could raise the mean even while the middle household loses D. The price level must have fallen

Exercise

Level, growth, and distribution

Compare 2007, 2009, and 2025 in Figure 1.2. Describe what happened to the level of real GDP per capita, distinguish a temporary decline from the long-run trend, and explain why the figure does not reveal what happened to the median household.

1.4 Jobs, unemployment, and participation

Whether people have paid work matters for income, security, social connection, and bargaining power. But no single labor-market statistic captures all of this.

Start with the working-age population and sort people into three broad groups:

- **Employed:** did paid work during the survey reference period, or had a job from which they were temporarily absent.

- **Unemployed:** did not have a job, were available for work, and had actively looked for work within the relevant period (with specific treatment for temporary layoffs).
- **Not in the labor force:** neither employed nor classified as unemployed. This group includes many students, retirees, caregivers, people with disabilities, and people who want work but do not meet the active-search definition.

The **labor force**⁷ is employed plus unemployed people. From these groups we can construct several rates:

$$\text{unemployment rate} = \frac{\text{unemployed}}{\text{labor force}} \times 100$$

$$\text{labor force participation rate} = \frac{\text{labor force}}{\text{civilian noninstitutional population aged 16+}} \times 100$$

$$\text{employment-population ratio} = \frac{\text{employed}}{\text{civilian noninstitutional population aged 16+}} \times 100$$

These denominators matter. The **labor force participation rate**⁸ and **employment-population ratio**⁹ use a broader population than the unemployment rate. If an unemployed person stops searching and leaves the labor force, the unemployment rate can fall even though nobody found a job. The participation rate and employment-population ratio help us see different parts of the change.

National totals also hide group differences. Employment opportunities and unemployment risks differ by race and ethnicity, gender, age, disability, education, location, and immigration status. A later draft should add a carefully chosen distributional figure rather than treating the headline rate as everyone's experience.

Review flag

Note for fact checkers: Check every classification above against current BLS CPS definitions, including the age and civilian noninstitutional-population denominator. Decide whether the final chapter should introduce U-3 by name and whether it should mention alternative underutilization measures U-1 through U-6. Starting source: [BLS concepts and definitions](#).

Questions

Question 1.5. Which person is classified as unemployed in the headline US measure?

A. A person without a job who wants work but has not actively searched recently B. A retired person who does not want paid work C. A person without a job who is available and has actively searched for work D. A part-time worker who would prefer full-time hours

⁷People who are employed plus people who are unemployed and actively seeking work under the statistical definition. See also: unemployment rate; labor force participation rate.

⁸The labor force as a percentage of the civilian noninstitutional population aged 16 and older. See also: labor force; unemployment rate; employment-population ratio.

⁹Employed people as a percentage of the civilian noninstitutional population aged 16 and older. See also: unemployment rate; labor force participation rate.

Question 1.6. The number of unemployed people is unchanged, but some employed people leave the labor force. What happens to the unemployment rate, other things equal?

A. It rises B. It falls C. It is unchanged D. There is not enough information

Question 1.7. Why might the unemployment rate fall while the employment-population ratio does not rise?

A. Some unemployed people may leave the labor force without becoming employed B. The two measures always use the same numerator C. A lower unemployment rate mechanically lowers employment D. Seasonal adjustment forces the two series to move in opposite directions

Exercise

Classifying the labor force

Suppose 165 million people are employed, 7 million are unemployed and actively searching, and 98 million are outside the labor force. Calculate the labor force, unemployment rate, participation rate, and employment-population ratio. Then describe one change that lowers measured unemployment without raising employment.

i Data Extension 1.1: Three views of the labor market

The headline unemployment rate is familiar, but it is only one view of the labor market. In this extension, you will compare it with labor force participation and employment, inspect the source metadata, and use the differences among the measures to evaluate economic claims.

Why add two more measures?

The unemployment rate asks what share of the labor force is jobless and searching. It does not tell us what share of adults is in the labor force or employed. Figure E1.1 therefore places three series side by side.

The top panel is familiar: unemployment rises in downturns and then falls. The middle panel asks a different question: what share of the civilian noninstitutional population aged 16 and older is working or actively looking? The bottom panel asks what share of that population is employed.

The panels do not always move together. After the Great Recession, for example, the unemployment rate eventually fell while labor force participation remained below its earlier level. In 2020, all three series moved abruptly, but in different directions and by different amounts. A complete account would distinguish population aging, schooling, caregiving, disability, discouragement, migration, public-health conditions, and labor demand. The figure alerts us to the puzzle; it does not decompose those causes.

Build the figure one measure at a time

Final figure

Three measures give different views of the labor market

Monthly, seasonally adjusted; panels use different vertical scales

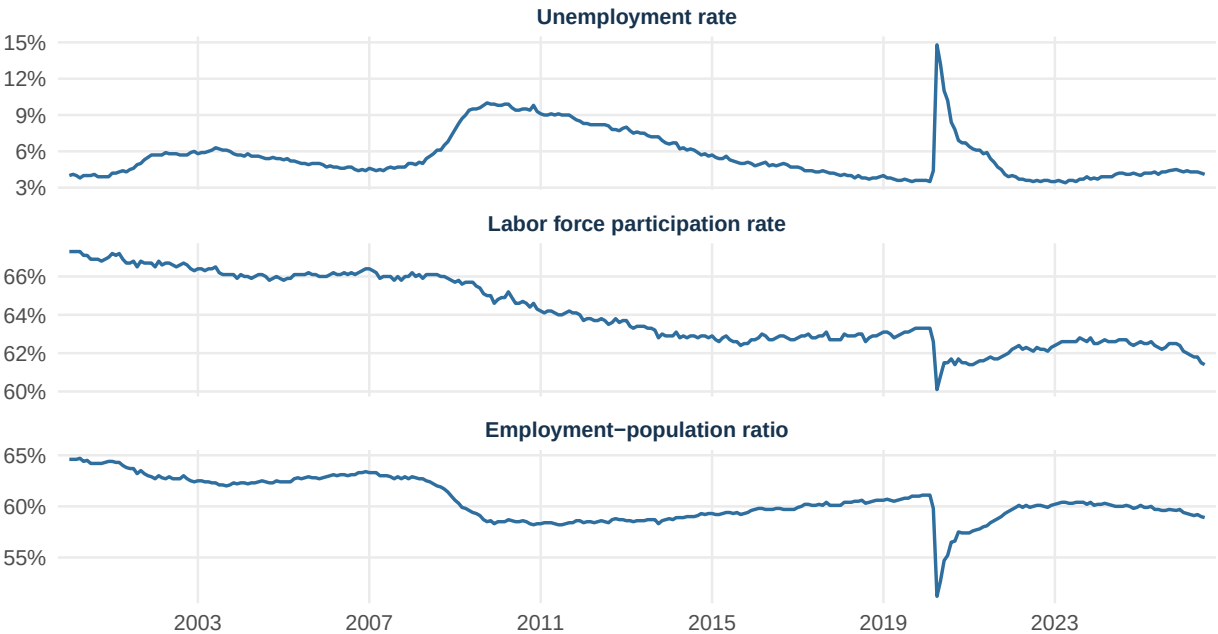


Figure 3: Three views of the US labor market, January 2000–July 2026. Each panel uses its own vertical scale. Source: U.S. Bureau of Labor Statistics via FRED, series UNRATE, CIVPART, and EMRATIO. Draft vintage accessed August 21, 2026.



Scan to open the live step-by-step figure, or use the linked figure title in the digital chapter.

Return to the summary Figure E1.1. The employment-population ratio does not depend on whether a non-employed person is actively searching. Compare its recovery with the recovery in the unemployment rate.

Read the FRED metadata

Open the FRED pages for [UNRATE](#), [CIVPART](#), and [EMRATIO](#). For each series, record:

Series	Question answered	Denominator to verify	Key limitation
UNRATE	What share of the labor force is unemployed?	Labor force	Excludes people outside the labor force

CIVPART	What share of the civilian noninstitutional population aged 16+ is in the labor force?	Civilian noninstitutional population aged 16+	Does not distinguish employed from unemployed
EMRATIO	What share of that population is employed?	Civilian noninstitutional population aged 16+	Does not describe job hours, pay, or quality

Your investigation

1. Choose January 2007, October 2009, February 2020, April 2020, and the latest common month. Record all three values.
2. For each interval, describe the direction of change in each series. Use **percentage points**¹⁰, not percent, when subtracting one rate from another.
3. Identify one period in which the unemployment rate and participation rate both fell. Explain two different stories that could be consistent with that pattern.
4. Use the metadata to explain why the three series are comparable in frequency and seasonal adjustment but do not measure the same concept.
5. Write one causal claim that Figure E1.1 cannot establish. Name one additional series or comparison that would help investigate it.

Review flag

Draft data review flag: Figure E1.1 is reproducible offline from pinned public FRED snapshots, but it is not yet data-manager approved. Final review must verify series definitions, vintages, seasonal adjustment, representative values, accessibility text, and redistribution terms. The public WIP may display it with this flag.

Questions

Question 1.E1. Five unemployed people stop searching while employment is unchanged. Which pair of measures reveals that nobody found work?

- A. A lower unemployment rate and unchanged employment-population ratio
 B. A lower unemployment rate and higher employment-population ratio
 C. An unchanged unemployment rate and lower participation rate
 D. A higher unemployment rate and unchanged participation rate

Exercise

Classification changes the dashboard

An economy has 200 working-age adults: 120 are employed, 10 are unemployed and actively searching, and 70 are outside the labor force. Calculate all three rates. Then suppose five unemployed people stop searching while employment is unchanged. Recalculate the rates and explain which headline could misleadingly sound positive.

¹⁰The arithmetic difference between two percentages; a rise from 4% to 5% is one percentage point.

1.5 Inflation and the cost of living

The **price level**¹¹ is an index summarizing the prices of a basket of goods and services. **Inflation**¹² is the rate at which that price level changes. The distinction is easiest to see with an example. If the price index rises from 100 to 110, inflation is 10%. If it then rises from 110 to 112.2, inflation has fallen to 2%, but the price level has not fallen back to 100.

Figure 4 calculates the percentage change in the seasonally adjusted **Consumer Price Index**¹³ from the same month one year earlier.

Reading Figure 1.4 one step at a time

Final figure

US inflation has varied substantially across periods

Consumer Price Index, seasonally adjusted

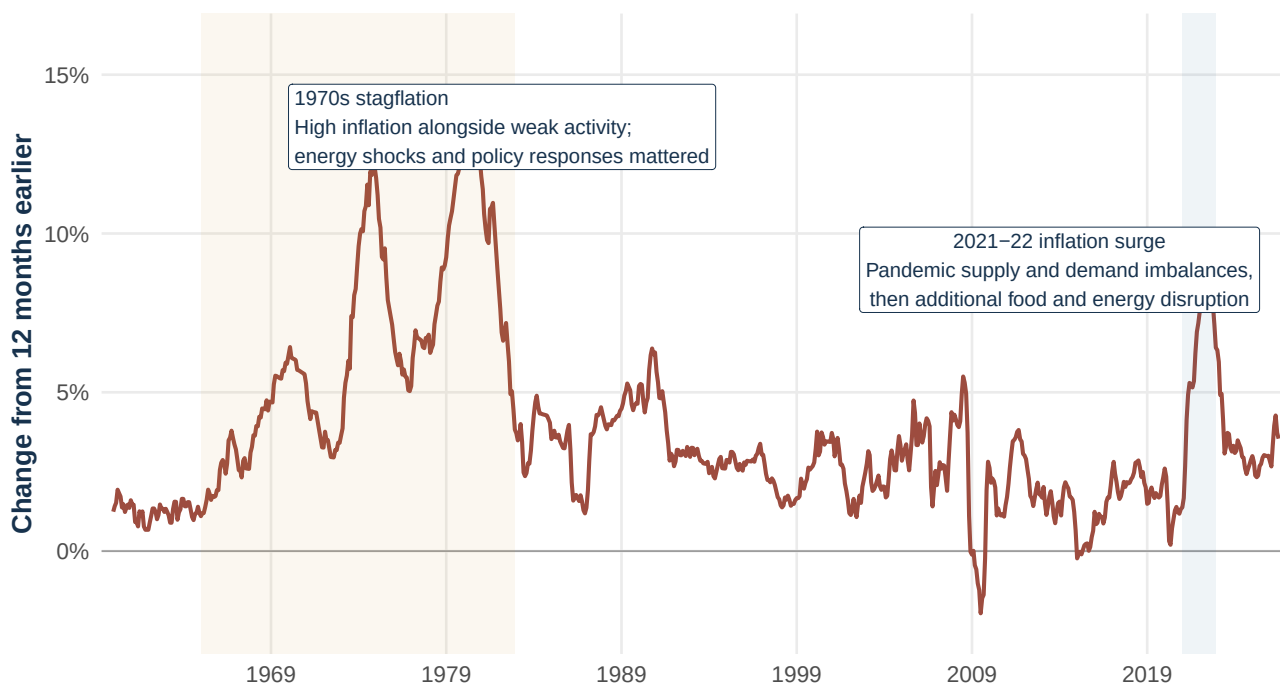


Figure 4: US consumer price inflation, 1960–2026. Twelve-month percentage change in CPIAUCSL calculated in R. Source: U.S. Bureau of Labor Statistics via FRED. Draft vintage accessed August 21, 2026.

¹¹An index summarizing the prices of a representative basket of goods and services at a point in time. See also: Consumer Price Index; inflation.

¹²An increase in the general price level, commonly expressed as the percentage change in a price index over a stated period. See also: price level; Consumer Price Index; real wage.

¹³A measure of the average change over time in prices paid by urban consumers for a representative basket of goods and services. See also: price level; inflation.



Scan to open the live step-by-step figure, or use the linked figure title in the digital chapter.

The final step highlights two periods. During the 1970s, high inflation coincided with weak economic activity and repeated energy shocks; monetary and fiscal policy, expectations, and the collapse of the earlier monetary framework also form part of the historical account (Bryan 2013). In 2021–22, pandemic-related supply constraints met strong demand, followed by additional food and energy disruption after Russia’s invasion of Ukraine (Shapiro 2022). These sources support treating each episode as multi-causal rather than attaching a single cause to a peak in the line.

The figure shows that inflation has not been constant. It was high and volatile in the 1970s and early 1980s, lower for much of the following four decades, and rose sharply after 2020 before declining. The graph alone cannot tell us how much of an episode came from energy prices, supply disruption, demand, wages, markups, expectations, or policy. Chapters 7 and 8 will develop those distinctions.

The national CPI also does not equal every household’s cost of living. Households buy different bundles. A renter facing a new lease, a driver with a long commute, and a retired homeowner with substantial medical expenses may experience the same period differently. An average index remains useful, but interpretation requires attention to weights, institutions, and distribution.

A **real wage**¹⁴ adjusts a nominal wage for the price level. It asks what the wage can buy, rather than how many dollars appear on a pay statement.

Side note

Everyday Economics 1.3

Inflation falling is not prices falling

If inflation falls from 8% to 3%, prices are still rising on average—just more slowly. A fall in the price level is **deflation**. When discussing your own budget, separate the change in the overall index from changes in the particular prices and quantities that matter to your household.

Draft source and reuse note

Draft source and reuse note. The distinction among nominal wages, a price index, inflation, and real purchasing power adapts [The Economy 2.0: Macroeconomics, Section 1.4](#). Chapter 1 introduces the measurement logic only; the full inflation mechanism belongs later.

Questions

Question 1.8. Inflation falls from 8% to 3% and remains positive. What happens to the general price level?

A. It falls by 5% B. It returns to its level before the 8% increase C. It continues to rise, but more slowly D. It is unchanged because inflation fell

Question 1.9. The unemployment rate rises from 4% to 5%. Which statement correctly describes the change?

¹⁴A wage adjusted for the price level so that it reflects purchasing power. See also: inflation; price level.

A. It rose by one percentage point and by 25% relative to its initial value B. It rose by 1% and one percentage point means the same thing C. It rose by five percentage points D. It rose by 0.25 percentage points

Exercise

Prices and inflation

A price index is 120 in Year 1, 126 in Year 2, and 129.15 in Year 3. Calculate inflation in each interval. Did the price level fall when inflation fell? If a worker's nominal wage rose 3% from Year 2 to Year 3, what happened approximately to the worker's real wage?

1.6 Recessions, crises, and recoveries

The long-run rise in output is not smooth. A **recession**¹⁵ is a broad contraction in economic activity, while a **recovery** is a period in which activity expands after a trough. The National Bureau of Economic Research dates US business-cycle peaks and troughs using several monthly and quarterly indicators, not a mechanical rule based only on two quarters of GDP.

A selective Chapter 1 timeline should eventually include:

- **The Great Depression:** a collapse in output, employment, and the banking system that transformed macroeconomic policy and institutions.
- **The inflation and unemployment shocks of the 1970s and early 1980s:** evidence that economies can face high inflation and weak labor-market conditions at the same time.
- **The Great Recession of 2007–09:** a housing and financial crisis followed by a deep employment downturn and a slow recovery for many households.
- **The 2020 pandemic recession:** an exceptionally rapid contraction linked to a public-health emergency, behavior changes, mandated restrictions, and policy responses, followed by an unusual recovery.

For now, treat these as episodes to compare, not as four identical events. Ask the same questions of each:

1. Which variables moved first and which moved later?
2. How large and persistent were the changes?
3. Which households, workers, firms, and places bore the largest costs?
4. Which institutions and policies shaped the response?
5. What evidence would distinguish competing explanations?

i Principle: Aggregation and feedback

The principle of aggregation and feedback asks whether reasoning that works for one actor still works when many actors behave similarly. If one household cuts spending to rebuild savings, it may become more financially secure. If many households cut spending together, firms may lose sales, reduce production, and cut jobs—feeding back into household income. Chapter 6 develops this mechanism.

¹⁵US business-cycle dates are determined by the NBER using multiple indicators; a recession is not defined solely as two consecutive quarters of falling real GDP. See also: real gross domestic product; unemployment rate.

 Review flag

Note for fact checkers: The final timeline needs named sources for dates, magnitudes, institutional changes, and causal language. Use [NBER business-cycle dates](#) for chronology, then assign episode-specific historical sources. Do not let the eventual timeline imply that recession dating itself identifies causes.

Questions

Question 1.10. A recession begins soon after interest rates rise. What can a timeline alone establish?

A. The interest-rate increase caused the recession B. The recession caused the earlier interest-rate increase
C. The rate increase preceded the downturn, which is a fact an explanation must address D. No useful statement can be made from chronology

Exercise

Chronology is not causation

Choose one recession episode named in this section. List two dated observations that a timeline could establish, one causal claim the timeline cannot establish, and one comparison or source that could help distinguish competing explanations.

1.7 Productivity, earnings, inequality, and government

Labor productivity¹⁶ measures how much output is produced per unit of labor input, often as output per hour worked. If output per hour rises, an economy can in principle produce more without requiring the same proportional increase in work hours. Technological change, skills, organization, infrastructure, and capital equipment can all contribute.

But greater productive capacity does not determine how the gains are divided. Figure 5 compares labor productivity with **average real hourly compensation** in the nonfarm business sector. Both series are set equal to 100 in the first quarter of 1973 so their subsequent proportional changes can be compared.

¹⁶Output produced per unit of labor input, often measured as output per hour worked. See also: real gross domestic product.

Reading Figure 1.5 one step at a time

Final figure

Productivity and average real compensation can grow at different rates

US nonfarm business sector, quarterly, seasonally adjusted

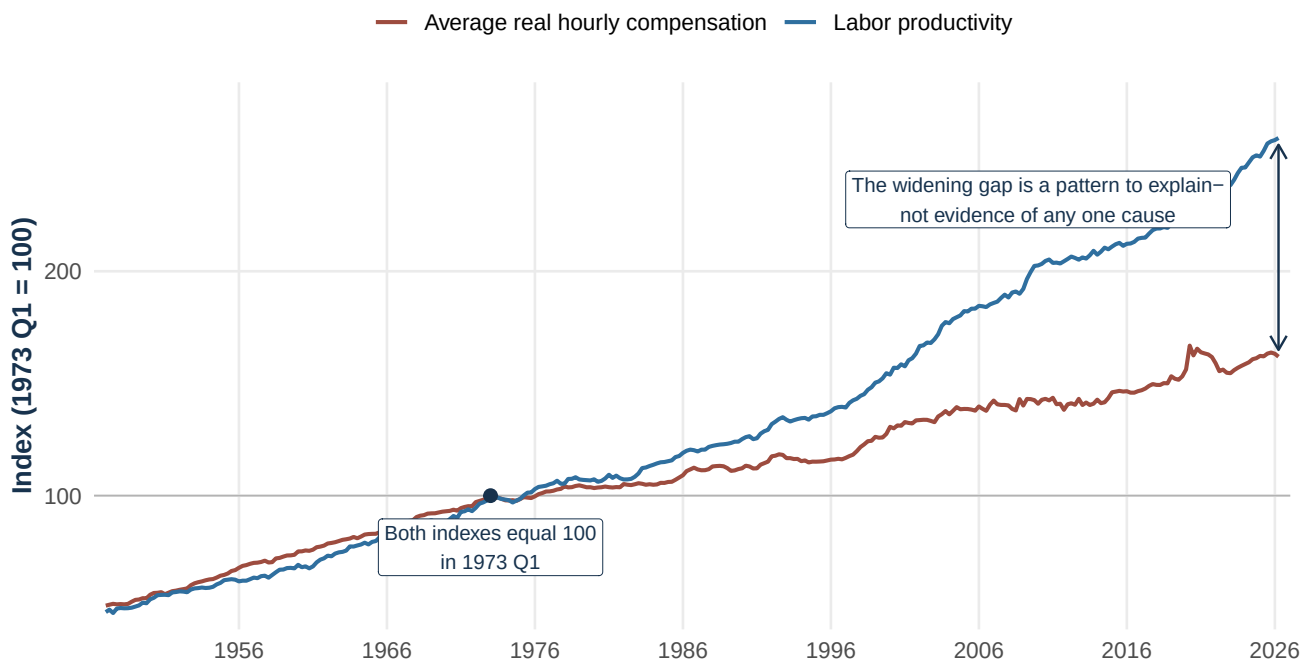


Figure 5: US nonfarm business labor productivity and average real hourly compensation, 1947–2026; 1973 Q1 = 100. Source: U.S. Bureau of Labor Statistics via FRED, series OPHNFB and COMPRNFB. Draft vintage accessed August 21, 2026.



Scan to open the live step-by-step figure, or use the linked figure title in the digital chapter.

The annotations mark the shared base and the later gap. They make the comparison easier to read but do not identify a cause or show what happened to the median worker.

The gap that develops is a puzzle, not a complete explanation. Several measurement choices matter:

- Compensation includes wages, salaries, and employer-paid benefits; it is not take-home pay.
- An average can rise even if the median worker's compensation rises more slowly.
- The two series cover the nonfarm business sector, not every worker or all production.
- Different price indexes or starting dates can change the appearance of the comparison.

The larger point survives these cautions: production, pay, and living standards are related, but no rule guarantees that they move together or that gains are shared equally. Bargaining power, labor-market institutions, corporate governance, taxation, social insurance, discrimination, and ownership all affect distribution.

Government is not outside the economy. It purchases goods and services, employs workers, taxes and transfers income, provides infrastructure and education, regulates markets, and writes or enforces many of the rules that shape private choices. Later chapters analyze particular policies. Here, the drafting task is to make government visible without treating every change in a time series as the result of a single policy.

Principle: Rules of the game

The rules of the game principle reminds us that statistics record outcomes generated under particular laws, institutions, and power relationships. Labor law, monetary arrangements, financial regulation, tax rules, social insurance, and the statistical definitions themselves influence what choices are feasible and how aggregate outcomes are measured.

Review flag

Note for data and fact checkers: Figure 1.5 is a diagnostic draft. Before approval, decide whether Chapter 1 should compare productivity with average compensation, median earnings, or both. Verify the deflator, sector coverage, benefit treatment, rebasing date, and the wording of any “typical worker” claim. Source pages: [OPHNFB](#) and [COMPRNFB](#).

Questions

Question 1.11. Why does Figure 1.5 not by itself show what happened to a typical worker’s take-home pay?

A. Labor productivity cannot be measured as output per hour
B. Average real hourly compensation includes benefits and is not a median or disposable-income measure
C. The two plotted series use exactly the same concept
D. Index numbers cannot compare growth over time

Exercise

Average productivity and typical pay

Use Figure 1.5 to describe the two indexed series after 1973. Then explain why average real hourly compensation is not the same as a typical worker’s take-home pay and identify one alternative earnings measure you would want to inspect.

1.8 What the dashboard reveals—and what it hides

Return to the three people who entered adulthood in different periods. A macroeconomic dashboard helps place each experience in context:

- real GDP per person locates the period within the long expansion of productive capacity;
- unemployment, participation, and employment indicate different dimensions of access to paid work;
- inflation distinguishes a changing price level from the pace at which prices are changing;
- productivity and compensation raise questions about how the gains from production are divided; and
- recessions show that long-run growth contains disruptions whose costs are unevenly distributed.

The dashboard is a beginning, not a verdict. It reveals common movements and turning points. It hides differences among people and places, unpaid work, job quality, environmental damage, and many of the institutions that generate the numbers. Most importantly, it does not automatically turn a correlation into a cause.

Questions to carry into the book

- What determines employment, unemployment, real wages, and inflation?
- Why can spending decisions create economy-wide feedback?
- How do banks, financial markets, the Federal Reserve, and fiscal policy affect households and firms?
- Why do productivity and living standards grow, and why are their gains distributed unequally?
- How do rules, institutions, power, and collective choices change aggregate outcomes?

For every figure you encounter, practice a three-sentence discipline:

1. **Observation:** What pattern does the figure show?
2. **Question:** What mechanism might explain the pattern?
3. **Limit:** What claim is not supported by this figure alone?

i Draft source and reuse note

Draft source and reuse note. The distinction between microeconomic interactions and macroeconomic aggregation and feedback adapts [The Economy 2.0: Macroeconomics, Section 1.9](#). The chapter uses US spelling and the UOE principles framework.

Questions

Question 1.12. Which is the strongest next step after observing that two macroeconomic series move together?

- A. State that one series caused the other B. Choose the explanation that best fits your prior belief
C. Specify possible mechanisms and seek comparisons or evidence that distinguish them D. Remove observations in which the series do not move together

Exercise

Observation, mechanism, and limit

Choose one chapter figure. Write three short paragraphs: an accurate observation, two possible mechanisms that could generate it, and a limitation followed by one additional source or comparison you would examine.

Seeing the principles in action

Principle	Example	Everyday Economics
Interdependence principle — focal	Workers' search decisions and firms' hiring decisions jointly determine employment and unemployment; neither side's choices can be interpreted in isolation.	A local employer's hiring freeze changes the options and expected search time facing many job seekers.
Doing the best you can principle	Workers decide whether and how to search given income needs, time, care obligations, transportation, information, and eligibility rules.	Two people who both want work may make different search choices because one has savings and reliable transportation while the other does not.
Rules of the game principle — focal	Statistical definitions determine who is classified as employed, unemployed, or outside the labor force; insurance and labor-market institutions also shape search.	A requirement to show active job search can affect both benefit eligibility and whether someone is counted as unemployed.
Trade-offs and opportunity costs principle	A person who keeps searching for a better job match forgoes current earnings and time, while accepting quickly may mean lower pay or poorer conditions.	Deciding whether to accept today's offer or search for another week makes the opportunity cost of continued search visible.
Principle of gains from cooperation and conflict of interest	Workers and employers can both gain from successful job matches, while conflict over pay, schedules, and conditions can prevent or end a match.	A vacancy may be filled only if the offered wage and conditions make the job acceptable to the worker and hiring worthwhile to the employer.
Principle of individual and societal interests	Stopping search may be sensible for one person facing high costs and poor prospects, yet widespread withdrawal can leave productive capacity unused and make headline unemployment fall misleadingly.	A falling unemployment rate need not mean that everyone who wanted work found a job.
Principle of aggregation and feedback — focal	Individual labor-force classifications aggregate into national rates; a change in participation can move the unemployment rate without a change in employment.	If many discouraged workers stop searching, the headline unemployment rate can fall even though their situation has not improved.

Skills and learning objectives

- Reading and interpreting an empirical graph (and its terms)
- Reading and comparing information in graphs with data
- Interpreting labor market statistics

- Computing a growth rate
- Defining important economic terms
- Understanding the difference between causality and correlation
- Understanding the strengths and limitations of using economic data
- Applying principles to a specific scenario

Concepts to learn

- Macroeconomics and aggregation
- Real gross domestic product and real GDP per capita
- Levels, changes, growth rates, percentages, and percentage points
- Data vintages and revisions
- Labor force, unemployment, labor force participation, and the employment-population ratio
- Price level, the Consumer Price Index, and inflation
- Nominal and real wages
- Recessions and recoveries
- Labor productivity and average real hourly compensation
- Correlation, causation, and evidence

Glossary

Chapter 1 terms

macroeconomics

Macroeconomics uses totals and averages such as aggregate output, employment, unemployment, and prices, while also studying feedback among households, firms, government, and other economies.

aggregation

Aggregation makes macroeconomic measurement possible but can conceal differences among groups and can introduce feedback that is not visible when one actor is considered alone.

real GDP per capita

Real GDP per capita measures the inflation-adjusted value of final goods and services produced within a country, divided by its population. It is an average of domestic production—not household income, a description of its distribution, or a complete measure of well-being.

See also: [real gross domestic product](#).

real gross domestic product

Real gross domestic product measures domestic production after removing the effect of changes in the overall price level. It is a total for the economy; dividing it by the population produces real GDP per capita.

See also: [real GDP per capita](#); [price level](#).

labor force

People who are employed plus people who are unemployed and actively seeking work under the statistical definition.

See also: [unemployment rate](#); [labor force participation rate](#).

unemployment rate

The headline unemployment rate divides the number of unemployed people by the labor force, not by the full working-age population. Its interpretation therefore depends on employment, active search, and labor-force classifications.

See also: [labor force](#); [labor force participation rate](#); [employment-population ratio](#).

labor force participation rate

The labor force as a percentage of the civilian noninstitutional population aged 16 and older.

See also: [labor force](#); [unemployment rate](#); [employment-population ratio](#).

employment-population ratio

Employed people as a percentage of the civilian noninstitutional population aged 16 and older.

See also: [unemployment rate](#); [labor force participation rate](#).

price level

An index summarizing the prices of a representative basket of goods and services at a point in time.

See also: [Consumer Price Index](#); [inflation](#).

Consumer Price Index

A measure of the average change over time in prices paid by urban consumers for a representative basket of goods and services.

See also: [price level](#); [inflation](#).

inflation

An increase in the general price level, commonly expressed as the percentage change in a price index over a stated period.

See also: [price level](#); [Consumer Price Index](#); [real wage](#).

real wage

A wage adjusted for the price level so that it reflects purchasing power.

See also: [inflation](#); [price level](#).

labor productivity

Output produced per unit of labor input, often measured as output per hour worked.

See also: [real gross domestic product](#).

recession

US business-cycle dates are determined by the NBER using multiple indicators; a recession is not defined solely as two consecutive quarters of falling real GDP.

See also: [real gross domestic product](#); [unemployment rate](#).

data vintage

The version of a dataset available on a particular date, including any revisions known at that time.

percentage point

The arithmetic difference between two percentages; a rise from 4% to 5% is one percentage point.

Flashcards

i Expandable web content

What does aggregation mean in macroeconomics?

Combining individual people, firms, goods, or transactions into an economy-wide total, rate, or average.

i Expandable web content

What seven items should you identify before interpreting a time-series graph?

Variable, population or denominator, units, frequency, adjustment, period or vintage, and source.

i Expandable web content

Why is real GDP per capita not the income of a typical household?

It is average inflation-adjusted domestic production per person; it does not show distribution and is not a direct household-income measure.

i Expandable web content

What is the denominator of the unemployment rate?

The labor force—the number of people classified as employed or unemployed.

i Expandable web content

Why can the unemployment rate fall without more people finding jobs?

Some unemployed people may stop actively searching and leave the labor force, reducing both unemployment and the labor-force denominator.

i Expandable web content

How does the employment-population ratio differ from the unemployment rate?

It divides employed people by the civilian noninstitutional population aged 16 and older instead of dividing unemployed people by the labor force.

i Expandable web content

If inflation falls from 8% to 3%, what happens to the price level?

The price level is still rising on average, but more slowly than before.

i Expandable web content

What is a real wage?

A wage adjusted for the price level so that it reflects purchasing power.

i Expandable web content

Why does a recession date not tell us the cause of a recession?

Dating identifies when broad activity contracted; causal explanation requires additional evidence and a mechanism.

i Expandable web content

What does labor productivity measure?

Output per unit of labor input, commonly output per hour worked.

i Expandable web content

Why is average real hourly compensation not the same as a typical worker's take-home pay?

It is an average, includes employer-paid benefits, and covers a particular sector; it is neither a median nor disposable income.

i Expandable web content

What three sentences should accompany an initial reading of a figure?

State an observation, pose a mechanism question, and identify a claim the figure cannot support alone.

References

- Bryan, Michael. 2013. *The Great Inflation*. Federal Reserve History. <https://www.federalreservehistory.org/essays/great-inflation>.
- Shapiro, Adam Hale. 2022. "How Much Do Supply and Demand Drive Inflation?" *FRBSF Economic Letter*, nos. 2022-15. <https://www.frbsf.org/research-and-insights/publications/economic-letter/how-much-do-supply-and-demand-drive-inflation/>.

Answers to Questions

The website provides answer-specific feedback after each choice. This print key gives the correct option and the feedback attached to it.

Question 1.1: B. To construct economy-wide totals, rates, and averages

Correct. Aggregation combines many individual observations into measures of the economy as a whole.

Question 1.2: B. The variable, denominator, units, frequency, adjustment, period or vintage, and source

Correct. These items establish what the graph measures before you interpret its pattern.

Question 1.3: C. Average inflation-adjusted domestic production per person rose substantially over the long run

Correct. That is the concept and long-run pattern shown.

Question 1.4: C. Large gains near the top could raise the mean even while the middle household loses

Correct. The mean weights all dollars, while the median tracks the middle observation.

Question 1.5: C. A person without a job who is available and has actively searched for work

Correct. Joblessness, availability, and active search are central to the classification.

Question 1.6: A. It rises

Correct. The numerator is unchanged while the labor-force denominator falls.

Question 1.7: A. Some unemployed people may leave the labor force without becoming employed

Correct. They leave the unemployment numerator and labor-force denominator but do not enter employment.

Question 1.E1: A. A lower unemployment rate and unchanged employment-population ratio

Correct. The unemployment rate can fall because people leave the labor force, while an unchanged employment-population ratio shows that employment did not rise.

Question 1.8: C. It continues to rise, but more slowly

Correct. Positive inflation means an increasing price level.

Question 1.9: A. It rose by one percentage point and by 25% relative to its initial value

Correct. The arithmetic difference is one percentage point; one divided by four is a 25% relative increase.

Question 1.10: C. The rate increase preceded the downturn, which is a fact an explanation must address

Correct. Chronology is evidence, but causal identification requires more.

Question 1.11: B. Average real hourly compensation includes benefits and is not a median or disposable-income measure

Correct. Coverage, averaging, benefits, and taxes distinguish it from typical take-home pay.

Question 1.12: C. Specify possible mechanisms and seek comparisons or evidence that distinguish them

Correct. This turns description into a testable causal investigation.