Inflation and Unemployment

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Introduction

- Inflation
  - Consumer Price Index
  - GDP Deflator
  - Inflation Rate
  - Quantity Theory of Money
- Unemployment
  - Statistics: UR & LFPR
  - Types of Unemployment

Inflation

Inflation, Defined

Inflation: An increase in the overall level of prices in the economy.

- Reflects that the value of money has changed.
- There are multiple prices in the economy. Need to aggregate/average them.
- Simple average is not a good choice. Some prices are more important than others. Need to weigh:
  1. Laspeyres index. Constant weights.
  2. Paasche index. Changing weights.

Consumer Price Index (CPI)

$$\text{CPI}_t = \frac{p_t^A \cdot q_0^A + p_t^B \cdot q_0^B}{p_0^A \cdot q_0^A + p_0^B \cdot q_0^B} = \frac{\text{Cost in period } t}{\text{Cost in period } 0}$$

- Constant weights: quantities of the base year q_0^A and q_0^B.
- Cost of the basket in t relative to the cost in base period.
- Simple way of tracking the inflation I face, under the assumption that my consumption doesn't vary.
- Example.

CPI Calculation

- The Bureau of Labor Statistics (BLS) calculates the CPI for a representative urban consumer in the US.
- Aggregate prices of goods in categories:
    1. Food and beverages
    2. Housing
    3. Apparel
    4. Transportation
    5. Medical care
    6. Recreation
    7. Education and communication
    8. Other goods and services

CPI Problems

- Substitution bias.
  - If consumers substitute away from more expensive goods, CPI will overstate the actual average price level.
- Introduction of new goods.
  - As new goods are introduced, consumers have more choice. CPI fails to capture this increase in consumer well-being.
- Unmeasured quality change.
  - If the quality of a good falls over time, you are getting less satisfaction for the same # of units. CPI fails to address this.

GDP Deflator

$$\text{GDP Deflator}_t = \frac{p_t^A \cdot q_t^A + p_t^B \cdot q_t^B}{p_0^A \cdot q_t^A + p_0^B \cdot q_t^B} = \frac{\text{Nominal GDP}}{\text{Real GDP}}$$

- Time-varying weights: quantities change in all periods.
- Nominal GDP relative to real GDP.
- Track inflation from (nominal vs real) GDP data.
- Example.

CPI vs GDP Deflator

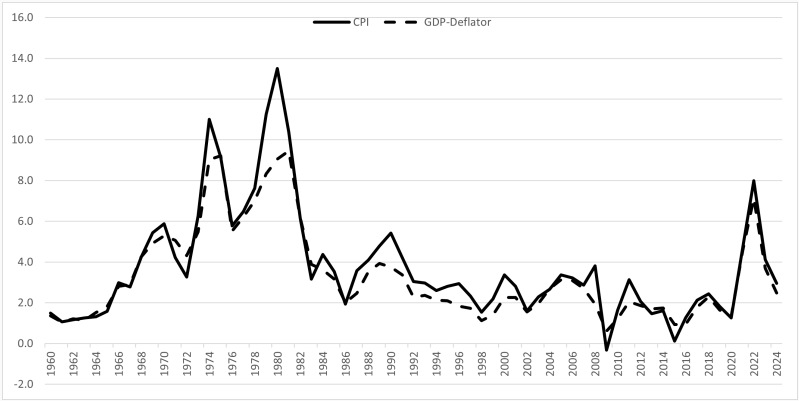
- GDP Deflator reflects prices of all goods (& services) produced domestically. CPI reflects prices of goods purchased by consumers.
  - Domestic vs imported goods.
- CPI focus on goods purchased by urban consumers. Deflator uses goods produced all over the country.
- CPI uses fixed quantity weights. Deflator uses time-varying quantity weights.

Inflation Rate

$$\text{Inf}(t-1,t) = \frac{P_t - P_{t-1}}{P_{t-1}}$$

- Where P_t is the value of the price index in period t.
- Inflation rate is a growth rate. Same comments as for the growth rate of real GDP previously discussed.

Inflation Rate Over Time



Velocity of Money, Defined

Velocity of Money: The average number of times that one unit of currency is used to purchase goods and services within a given time period.

- It represents how many times per period money is changing hands.
- Ratio of nominal expenditures to money in circulation:

$$V = \frac{PY}{M}$$

- Rearrange to get the equation of exchange.

Equation of Exchange

$$M \cdot V = P \cdot Y$$

- M: Total money supply in circulation in the economy.
- V: Velocity of money.
- P: Price level.
- Y: An index of newly produced goods and services.

Quantity Theory of Money: Assumptions

$$M \cdot \bar{V} = P \cdot \bar{Y}$$

1. The amount of real output Y is exogenous.
2. Velocity of money is constant over time.
3. The supply of money is exogenous and can be controlled by the monetary authority.

Quantity Theory of Money: Implications

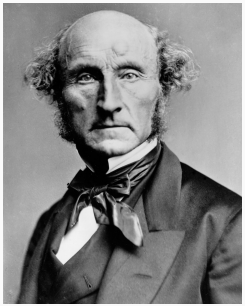
$$M \cdot \bar{V} = P \cdot \bar{Y}$$

- There's a causal effect of M on P.
- The price level is proportional to the money supply.
- A constant growth rate in the money stock will lead to a constant inflation rate, as long as real output grows at a constant rate.

Quantity Theory of Money: Discussion

- The theory works best as a long-run relationship between money and prices.
- Empirically, the link between money growth and inflation is strong in high inflation episodes.
- Does not explain how prices adjust.
- Very crude theory of money demand: transaction demand for money. (Solve for M/P).

Jonh Stuart Mill on the Quantity Theory

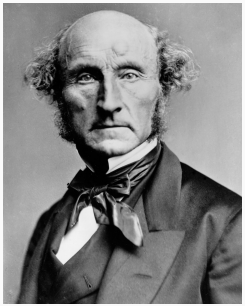


John Stuart Mill

Let us rather suppose, therefore, that to every pound, or shilling, or penny, in the possession of any one, another pound, shilling, or penny, were suddenly added. There would be an increased money demand, and consequently an increased money value, or price, for things of all sorts. This increased value would do no good to any one; would make no difference, except that of having to reckon pounds, shillings, and pence, in higher numbers. It would be an increase of values only as estimated in money, a thing only wanted to buy other things with; and would not enable any one to buy more of them than before. Prices would have risen in a certain ratio, and the value of money would have fallen in the same ratio.[a]

[a] From Mill's Principles of Political Economy, Vol. 2 Book III Chapter VIII

Jonh Stuart Mill on the Quantity Theory II



John Stuart Mill

The proposition which we have laid down respecting the dependence of general prices upon the quantity of money in circulation, must be understood as applying only to a state of things in which money, that is, gold or silver, is the exclusive instrument of exchange, and actually passes from hand to hand at every purchase, credit in any of its shapes being unknown. [...] But on a subject so full of complexity as that of currency and prices, it is necessary to lay the foundation of our theory in a thorough understanding of the most simple cases, which we shall always find lying as a groundwork or substratum under those which arise in practice. That an increase of the quantity of money raises prices, and a diminution lowers them, is the most elementary proposition in the theory of currency, and without it we should have no key to any of the others.[a]

[a] From Mill's Principles of Political Economy, Vol. 2 Book III Chapter VIII

Unemployment

Employment, Defined

Employed: People are considered employed if they did any work at all for pay or profit during the survey reference week.

- This includes both part-time and full-time.
- If the person wasn't working during survey reference week because she was on vacation, on leave, etc. She's included.
- Also unpaid family workers.

Unemployment, Defined

Unemployed: People are classified as unemployed if they do not have a job, have actively looked for work in the prior 4 weeks, and are currently available for work.

- Actively looked: contact an employer, submit a CV, answering a job advertisement, etc.
- Passive methods of job search do not have the potential to connect job seekers with potential employers and therefore do not qualify as active job search methods.

Labor Force

Labor Force: The labor force is made up of the employed and the unemployed.

- People who are neither employed nor unemployed are not in the labor force.
- Many who are not in the labor force are going to school or are retired.
- Family responsibilities keep others out of the labor force.

Survey Questions

See How the Government Measures Unemployment.

- Last week, did you do any work for pay (or profit)?
  - Yes/No.
- Have you been doing anything to find work during the last 4 weeks?
  - Yes/No.
- What are all of the things you have done to find work during the last 4 weeks?

Unemployment Rate

$$\text{ur} = \frac{\text{U}}{\text{LF}}$$

- U: Number of unemployed people.
- E: Number of employed people.
- LF=E+U: Number of people in the labor force.
- What percent of the labor force is unemployed.

Labor Force Participation Rate

$$\text{LFPR} = \frac{\text{LF}}{\text{AP}}$$

- AP: Adult population, civilian noninstitutional population 16 years old and over.
- LFPR measures the percentage of the population that is either working or actively seeking work.

Employment to Population Ratio

$$\text{E-PR} = \frac{\text{E}}{\text{AP}}$$

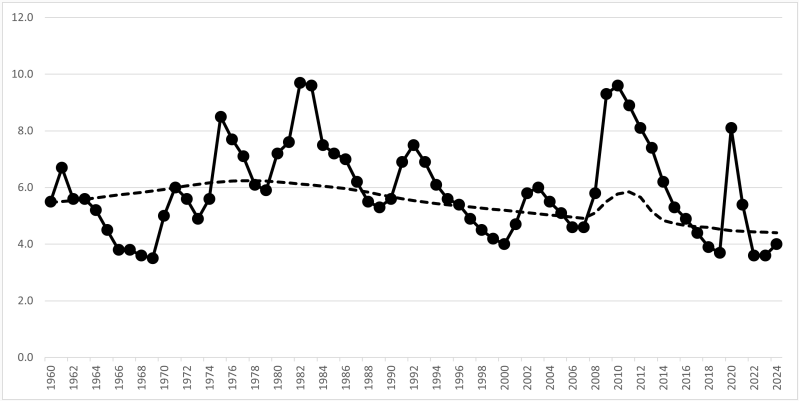
- The number of employed as a percentage of the civilian noninstitutional population 16 years old and over.
- It is the percentage of the population that is currently working.

Employment Data - November of 2025

	Men	Woman	Total
Adult Population	134.0	140.7	274.6
Employed	86.6	77.5	164.1
Unemployed	3.9	3.5	7.4
Labor Force	90.5	80.9	171.5
Not in LF	43.4	59.7	103.2

- Calculate UR, LFPR, and employment to population ratio.
- Visual representation.

UR Over Time


12.0
10.0
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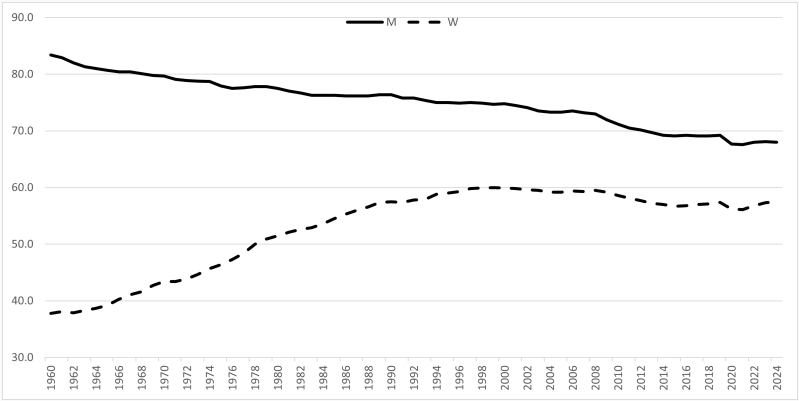
LFPR Over Time



Types of Unemployment

- Frictional Unemployment. Short-term unemployment that arises from the process of matching workers with jobs.
- Structural Unemployment. Unemployment that arises from a persistent mismatch between the skills or attributes of workers and the requirements of jobs.
- Cyclical Unemployment. Unemployment causes by a business cycle recession.

Natural Rate of Unemployment

- The sum of frictional and structural unemployment is considered to be the normal underlying level of unemployment in the economy.
- Remove the component associated with the business cycle.
- Also known as the full employment rate of unemployment.

Explanations of Unemployment

1. Classical (before Keynes).
2. Keynes (1930s): Insufficient aggregate demand.
3. Okun's Law (1960s): Tied to business cycle.
4. Natural Rate (1960s): long-run unemployment pinned by real factors.
5. Search & Matching (since 1990s).