



**IBM6520 Market Forecasting
Project Proposal**

Ricky Woznichak, Bansi Khachar, Matthew Prado, Saurabh Parate

Topic: Analyzing the Relationship Between the U.S. Unemployment Rate and Consumer Price Index (CPI)

The project aims to explore the relationship between two key U.S. economic indicators: the Unemployment Rate and the Consumer Price Index (CPI). Through time series analysis, including decomposition, regression, and forecasting models, the objective is to identify trends, seasonality, and cyclicalities, and determine if the unemployment rate significantly influences inflation (CPI).

We are collectively interested in this project because the U.S. Unemployment Rate and Consumer Price Index are vital indicators of economic health. If the variables are correctly evaluated, this will further help policy makers make better informed decisions about the monetary policies, interest rates and further control inflation. Businesses and investors will also get benefits by this as they will be able to forecast the economic conditions and can manage the financial risks effectively.

The data is secondary from the US Bureau of Labor Statistics. In this project we will be using two datasets which are US Unemployment Rate and US Consumer Price Index.

1. US Unemployment Rate (2000-2025):

- Measures the percentage of the labor force actively seeking but unable to find employment.
- Reflects economic conditions and labor market stability.

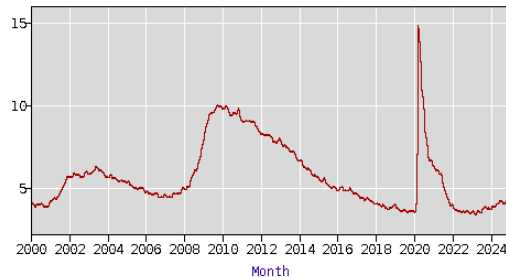
Databases, Tables & Calculators by Subject

Change Output Options: From: 2000 To: 2025 [GO](#)
☒ include graphs ☐ include annual averages [More Formatting Options](#) ➔

Data extracted on: March 20, 2025 (6:40:42 PM)

Labor Force Statistics from the Current Population Survey

Series Id: LNS14000000
Seasonally Adjusted
Series title: (Seas) Unemployment Rate
Labor force status: Unemployment rate
Type of data: Percent or rate
Age: 16 years and over



2. US Consumer Price Index (2000-2025)

- Measures the average change over time in the prices paid by consumers for a market basket of goods and services.
- Indicates inflation or deflation trends.

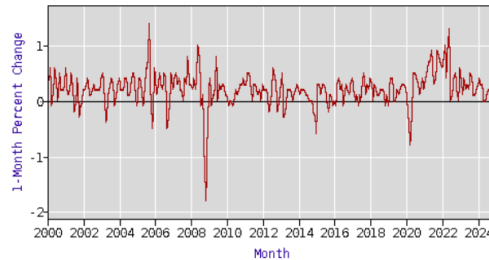
Databases, Tables & Calculators by Subject

Change Output Options: From: 2000 To: 2025 [GO](#)
☒ include graphs ☐ include annual averages [More Formatting Options](#) ➔

Data extracted on: March 20, 2025 (6:33:18 PM)

Consumer Price Index for All Urban Consumers (CPI-U)

1-Month Percent Change
Series Id: CUSR0000SA0
Seasonally Adjusted
Series Title: All items in U.S. city average, all urban consumers, seasonally adjusted
Area: U.S. city average
Item: All items
Base Period: 1982-84=100



Modelling techniques

a) Exploratory data analysis

- **Visualization:** line plots to visualize trends and scatter plots with a regression line to assess the correlation
- **Correlation analysis:** Pearson correlation coefficient to measure the relationship's strength.

b) Time series decomposition

- **Trend:** Shows long-term growth or decline in CPI and unemployment rates.
- **Seasonality:** Identifies recurring patterns (e.g., holiday season effects, seasonal employment).
- **Cyclic Component:** Reveals irregular economic cycles (booms and recessions).

c) Autocorrelation function (ACF)

- Shows how strongly past values influence future values.
- Significant spikes indicate correlated lags, revealing dependencies.
- ACF helps determine the lag values for ARIMA modeling.
- Significant lags indicate where the model should focus.

d) ARIMA (AutoRegressive Integrated Moving Average)

- Separate ARIMA models for CPI and unemployment.
- 12-month forecast with confidence intervals.

e) Simple Linear Regression (SLR)

- **R-squared:** Measures the explanatory power of the model.
- **P-values:** Tests the statistical significance of the relationship.

Managerial Implications

a) For Policymakers:

- A negative correlation may support the Phillips Curve theory, highlighting the trade-off between inflation and unemployment.
- Helps in interest rate adjustments and economic stability strategies.

b) For Businesses & Investors:

- Predicting inflation trends based on unemployment rates assists in financial planning and risk management.

c) For Economic Forecasting:

- Forecasting future trends of both indicators enhances economic preparedness.
- Detecting cyclicalities and seasonality allows for improved economic models.

References:

Bureau of Labor Statistics Data. (n.d.). Bureau of Labor Statistics.

- Unemployment rate dataset

<https://data.bls.gov/timeseries/LNS14000000>

- Consumer Price Index data

<https://data.bls.gov/timeseries/CUSR0000SA0>