Federal Reserve Ecomomic Data (FRED)

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import pandas as pd  
import numpy as np  
import matplotlib.pyplot as plt  
import seaborn as sns  
import pandas\_datareader as pdr  
import plotly.express as px

### Begin Analysis of Unemployment Data (UNRATE)

#### Unemployment Rate Over Time

View data of the unemployment rate, or the number of people 16 and over actively searching for a job as a percentage of the total labor force.

unemployment\_data = pdr.get\_data\_fred('UNRATE')  
fig = px.line(unemployment\_data, x=unemployment\_data.index, y='UNRATE', title='Unemployment Rate Over Time')  
fig.update\_xaxes(rangeslider\_visible=True)  
fig.show()

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#### Unemployment Rate Over Time (Year over Year)

# Extracting month and year from the index  
unemployment\_data['Month'] = unemployment\_data.index.month  
unemployment\_data['Year'] = unemployment\_data.index.year  
  
# Resetting index for plotting  
unemployment\_data\_reset = unemployment\_data.reset\_index(drop=True)  
  
# Creating the plot  
fig = px.line(unemployment\_data\_reset, x='Month', y='UNRATE', color='Year', title='Unemployment Rate Over Time (Yr over Yr)')  
  
# Updating x-axis to show only months  
fig.update\_xaxes(  
 tickmode='array',  
 tickvals=list(range(1, 13)),  
 ticktext=['Jan', 'Feb', 'Mar', 'Apr', 'May', 'Jun', 'Jul', 'Aug', 'Sep', 'Oct', 'Nov', 'Dec']  
)  
  
fig.show()

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#### Unemployment Rate Excluding 2020

# Filtering the data to exclude the year 2020  
unemployment\_data\_exclude\_2020 = unemployment\_data\_reset[unemployment\_data\_reset['Year'] != 2020]  
  
# Creating the plot excluding 2020 data  
fig\_exclude\_2020 = px.line(unemployment\_data\_exclude\_2020, x='Month', y='UNRATE', color='Year', title='Unemployment Rate Excluding 2020')  
  
# Updating x-axis to show only months  
fig\_exclude\_2020.update\_xaxes(  
 tickmode='array',  
 tickvals=list(range(1, 13)),  
 ticktext=['Jan', 'Feb', 'Mar', 'Apr', 'May', 'Jun', 'Jul', 'Aug', 'Sep', 'Oct', 'Nov', 'Dec']  
)  
  
fig\_exclude\_2020.show()

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### Inflation Rate Data (Consumer Price Index: CPI)

Index 1982-1984=100, Monthly, Not Seasonally AdjustedJan 1913 to Aug 2023 (4 days ago) View data of the CPI, or an inflation measure derived from tracking the changes in the weighted-average **price of a basket** of common goods and services.

#### Inflation Rate Over Time

# Retrieving inflation rate data (Consumer Price Index)  
inflation\_data = pdr.get\_data\_fred('CPIAUCNS')  
inflation\_data.describe()  
# Creating a single line plot for inflation rate data with dates on the x-axis  
fig\_single\_line = px.line(inflation\_data, x=inflation\_data.index, y='CPIAUCNS', title='Inflation Rate Over Time')  
  
# Adding a date slider to the plot  
fig\_single\_line.update\_xaxes(rangeslider\_visible=True)  
  
fig\_single\_line.show()

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#### Inflation Rate by Month and Year

# Extracting month and year from the index for inflation data  
inflation\_data['Month'] = inflation\_data.index.month  
inflation\_data['Year'] = inflation\_data.index.year  
  
# Resetting index for plotting  
inflation\_data\_reset = inflation\_data.reset\_index(drop=True)  
  
# Creating the plot with the same settings as the unemployment rate plot  
fig\_inflation = px.line(inflation\_data\_reset, x='Month', y='CPIAUCNS', color='Year', title='Inflation Rate by Month and Year')  
  
# Updating x-axis to show only months  
fig\_inflation.update\_xaxes(  
 tickmode='array',  
 tickvals=list(range(1, 13)),  
 ticktext=['Jan', 'Feb', 'Mar', 'Apr', 'May', 'Jun', 'Jul', 'Aug', 'Sep', 'Oct', 'Nov', 'Dec']  
)  
  
fig\_inflation.show()

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#### Inflation Rate Over Time (in %)

# Calculating the inflation rate in percentage  
inflation\_data['Inflation\_Rate'] = inflation\_data['CPIAUCNS'].pct\_change() \* 100 # pct\_change computes percentage change  
  
# Filtering out the first row since percentage change from the first to the second row will result in a NaN value  
inflation\_data\_filtered = inflation\_data.dropna()  
  
# Creating a single line plot for inflation rate in percentage with dates on the x-axis  
fig\_inflation\_percent = px.line(inflation\_data\_filtered, x=inflation\_data\_filtered.index, y='Inflation\_Rate', title='Inflation Rate Over Time (in %)')  
  
# Adding a date slider to the plot  
fig\_inflation\_percent.update\_xaxes(rangeslider\_visible=True)  
  
fig\_inflation\_percent.show()

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#### Year-Over-Year Inflation Rate (in %)

# Calculating the year-over-year inflation rate in percentage  
inflation\_data['YoY\_Inflation\_Rate'] = inflation\_data['CPIAUCNS'].pct\_change(periods=12) \* 100 # Using periods=12 for year-over-year change  
  
# Filtering out the rows with NaN values (the first 12 rows will have NaN values for YoY inflation rate)  
inflation\_data\_filtered\_yoy = inflation\_data.dropna(subset=['YoY\_Inflation\_Rate'])  
  
# Creating a single line plot for year-over-year inflation rate in percentage with dates on the x-axis  
fig\_inflation\_yoy = px.line(inflation\_data\_filtered\_yoy, x=inflation\_data\_filtered\_yoy.index, y='YoY\_Inflation\_Rate', title='Year-Over-Year Inflation Rate (in %)')  
  
# Adding a date slider to the plot  
fig\_inflation\_yoy.update\_xaxes(rangeslider\_visible=True)  
  
fig\_inflation\_yoy.show()

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### 30 year treasury rates

Percent, Monthly, Not Seasonally AdjustedFeb 1977 to Aug 2023 (Sep 1) Yields on actively traded non-inflation-indexed issues adjusted to constant maturities. The 30-year Treasury constant maturity series was discontinued on February 18, 2002, and reintroduced on February 9, 2006. #### 30-Year Treasury Rates Over Time

# Retrieving 30-year treasury rates data  
treasury\_data = pdr.get\_data\_fred('GS30')  
  
# Extracting month and year from the index for treasury data  
treasury\_data['Month'] = treasury\_data.index.month  
treasury\_data['Year'] = treasury\_data.index.year  
  
# Resetting index for plotting  
treasury\_data\_reset = treasury\_data.reset\_index(drop=True)  
  
# Creating a single line plot for 30-year treasury rates with dates on the x-axis  
fig\_treasury\_single\_line = px.line(treasury\_data, x=treasury\_data.index, y='GS30', title='30-Year Treasury Rates Over Time')  
  
# Adding a date slider to the plot  
fig\_treasury\_single\_line.update\_xaxes(rangeslider\_visible=True)  
  
fig\_treasury\_single\_line.show()

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#### 30-Year Treasury Rates by Year

# Resetting index for plotting  
treasury\_data\_reset = treasury\_data.reset\_index(drop=True)  
  
# Creating the plot for 30-year treasury rates with one line for each year  
fig\_treasury\_by\_year = px.line(treasury\_data\_reset, x='Month', y='GS30', color='Year', title='30-Year Treasury Rates by Year')  
  
# Updating x-axis to show only months  
fig\_treasury\_by\_year.update\_xaxes(  
 tickmode='array',  
 tickvals=list(range(1, 13)),  
 ticktext=['Jan', 'Feb', 'Mar', 'Apr', 'May', 'Jun', 'Jul', 'Aug', 'Sep', 'Oct', 'Nov', 'Dec']  
)  
  
fig\_treasury\_by\_year.show()

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### 30-Year Fixed Rate Mortgage Average

unemployment\_data = pdr.get\_data\_fred('MORTGAGE30US')  
fig = px.line(unemployment\_data, x=unemployment\_data.index, y='MORTGAGE30US', title='30-Year Fixed Rate Mortgage Average')  
fig.update\_xaxes(rangeslider\_visible=True)  
fig.show()

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#### 30-Year Fixed Rate Mortgage (Year over Year)

# Extracting month and year from the index  
unemployment\_data['Month'] = unemployment\_data.index.month  
unemployment\_data['Year'] = unemployment\_data.index.year  
  
# Resetting index for plotting  
unemployment\_data\_reset = unemployment\_data.reset\_index(drop=True)  
  
# Creating the plot  
fig = px.line(unemployment\_data\_reset, x='Month', y='MORTGAGE30US', color='Year', title='30-Year Fixed Rate Mortgage Over (Yr over Yr)')  
  
# Updating x-axis to show only months  
fig.update\_xaxes(  
 tickmode='array',  
 tickvals=list(range(1, 13)),  
 ticktext=['Jan', 'Feb', 'Mar', 'Apr', 'May', 'Jun', 'Jul', 'Aug', 'Sep', 'Oct', 'Nov', 'Dec']  
)  
  
fig.show()

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#### 30 Year Mortage Rate Excluding 2020

# Filtering the data to exclude the year 2020  
unemployment\_data\_exclude\_2020 = unemployment\_data\_reset[unemployment\_data\_reset['Year'] != 2020]  
  
# Creating the plot excluding 2020 data  
fig\_exclude\_2020 = px.line(unemployment\_data\_exclude\_2020, x='Month', y='MORTGAGE30US', color='Year', title='30-Year Fixed Rate Mortgage Excluding 2020')  
  
# Updating x-axis to show only months  
fig\_exclude\_2020.update\_xaxes(  
 tickmode='array',  
 tickvals=list(range(1, 13)),  
 ticktext=['Jan', 'Feb', 'Mar', 'Apr', 'May', 'Jun', 'Jul', 'Aug', 'Sep', 'Oct', 'Nov', 'Dec']  
)  
  
fig\_exclude\_2020.show()

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