

# **The Big Squeeze - The Effect of Inflation on Housing, Unemployment and the Stock Market**

**Project #1 - Team 9**

**Team Members**

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# Executive Summary

Our team analyzed inflation trends during the pre- and post-pandemic periods, focusing on key economic indicators. The research examined:

1. **Annual Inflation Trends based off the Consumer Price Index (CPI)**
2. **CPI and the Stock Market (S&P 500) performance**
3. **CPI and its effects on Housing Costs and Unemployment**
4. **Overall Correlation**

This study highlights inflation's broad impact on housing, markets, and employment, emphasizing the need for ongoing monitoring to inform economic policies.

# Data Pre-Processing

## Data Collection, Exploration and Cleanup Methods:

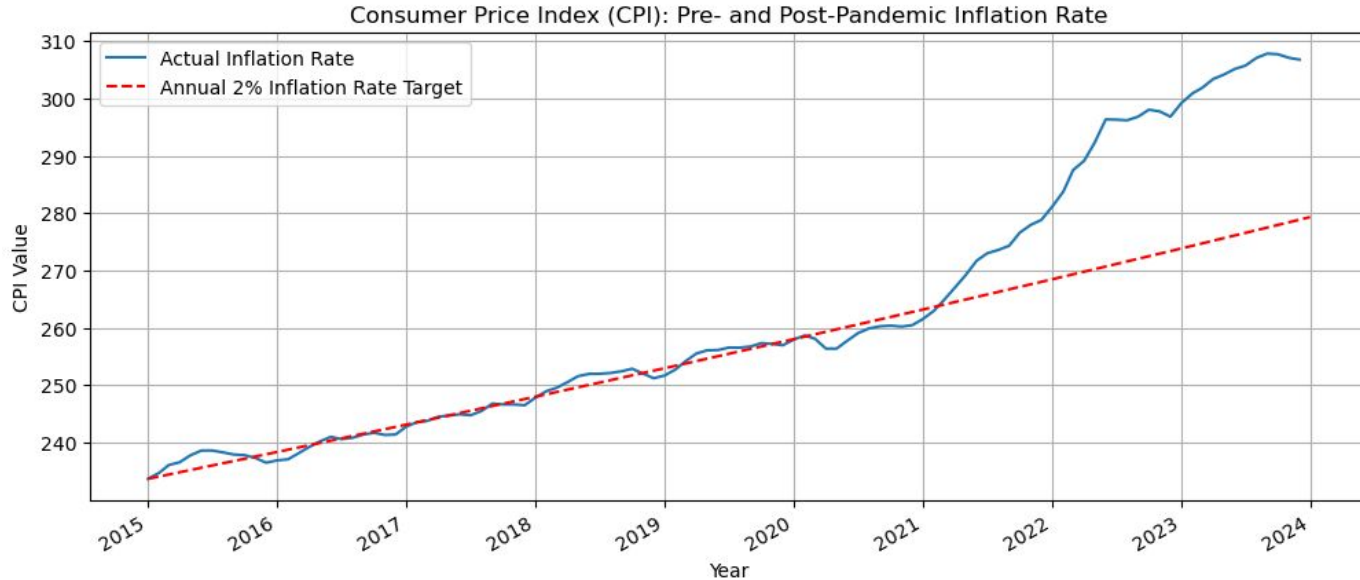
- **Data Sources:**
  - U.S. Bureau of Labor Statistics (BLS)
  - Federal Reserve Economic Data (FRED)
  - U.S. Department of Labor
  - Yahoo Finance
- **Data Formats:**
  - APIs
  - CSV files
- **Data Cleanup:**
  - Indexing the datasets to 100 for a better comparison and using min-max techniques. Renamed and filtered datasets for clarity, and resolved missing data.

# Team Approach

## **Collaborative and Structured:**

- Used a **Divide and Conquer** strategy to optimize strengths and contributions.
- Organized work with separate notebooks and slide decks. Analyzed sub-modules in detail, encouraging diverse perspectives.
- Explored different problem-solving methods and integrated individual outputs into a cohesive final deliverable.

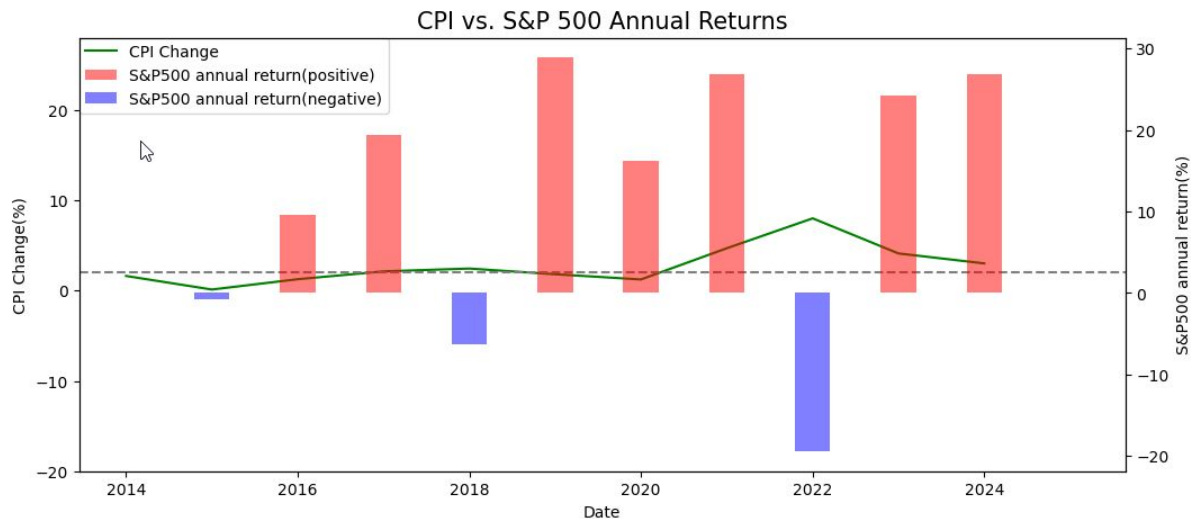
# Consumer Price Index (CPI): Inflation Rate



## Analysis:

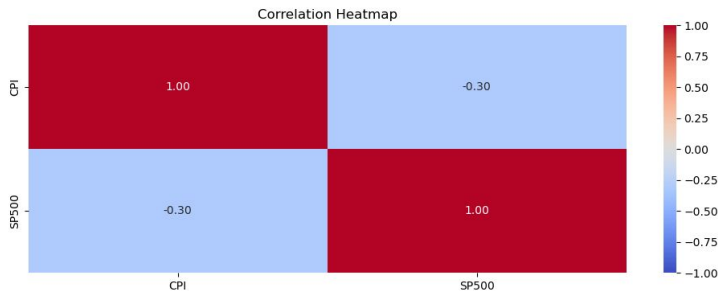
- The CPI measures inflation (**blue** line), aligning with the 2% target (**red** line) until 2021, when it rises sharply.

# Is there a correlation between CPI and S&P 500 Performance?



## Analysis:

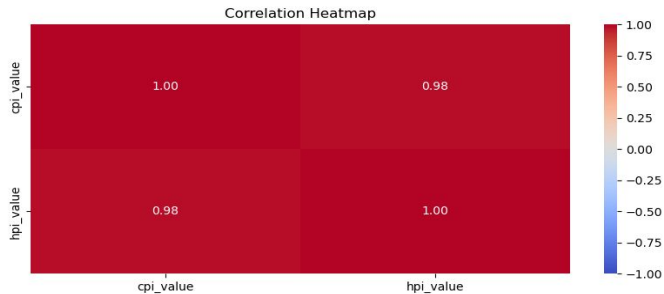
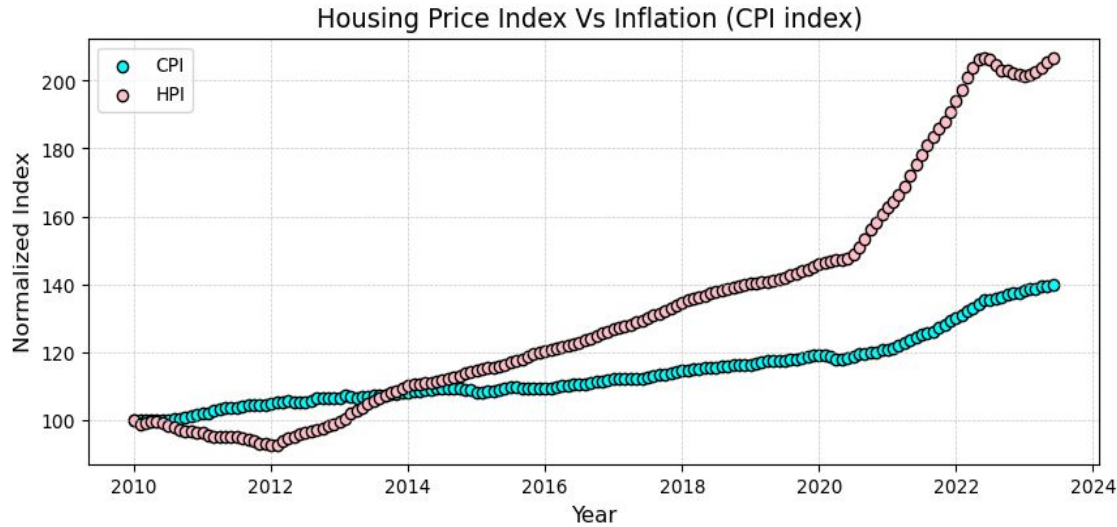
- The CPI is the **green** line, with **blue** and **red** bars showing stock performance. The trend was that as stocks fell, inflation rose.



## Correlation

- CPI and S&P 500 have a correlation coefficient of **-0.30** (closer to 0) indicating a **weak negative** correlation.

# Is there a correlation between HPI & Inflation (CPI)?



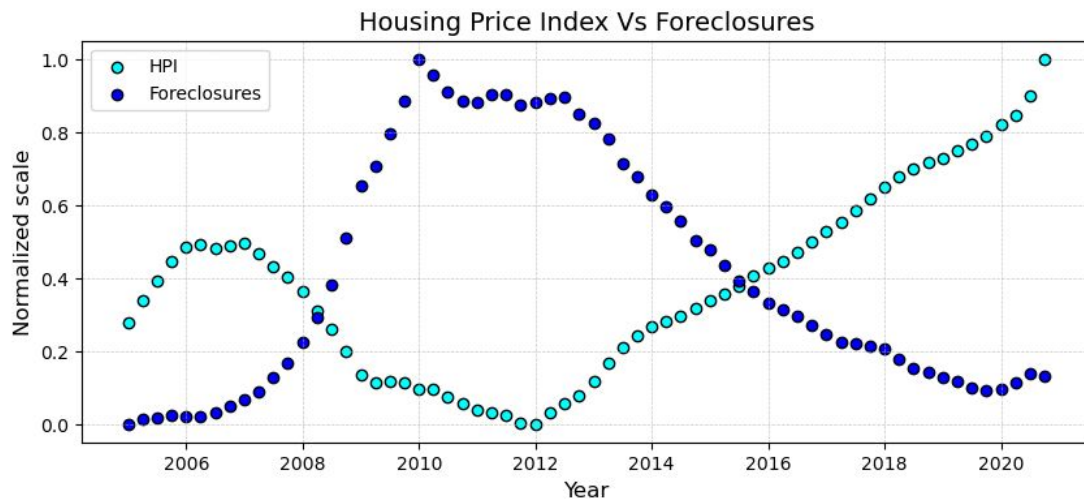
## Analysis:

- **Divergence:**
  - Negative In 2010
  - Positive in 2015
- **Convergence:** In 2014
- Both data points trend upwards indicating a **positive direction**.
- Data points are tightly clustered along a clear line, indicating a strong **relationship**.

## Correlation

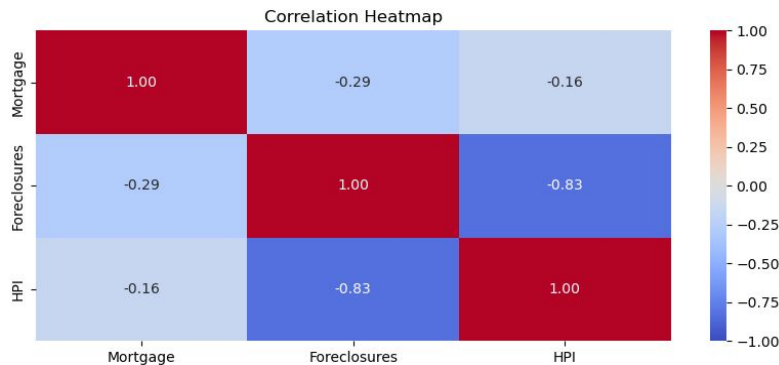
- HPI and CPI has a correlation coefficient as **0.98** (closer to 1) indicating a **strong positive Correlation**

# Home Price Index (HPI) vs Foreclosure rates



## Analysis:

- Data points trend downwards indicating a **negative** correlation.
- Data points are tightly clustered across a clear line indicating a **strong relationship**.
- Curved points also suggest a **non-linear (inverse)** relationship.



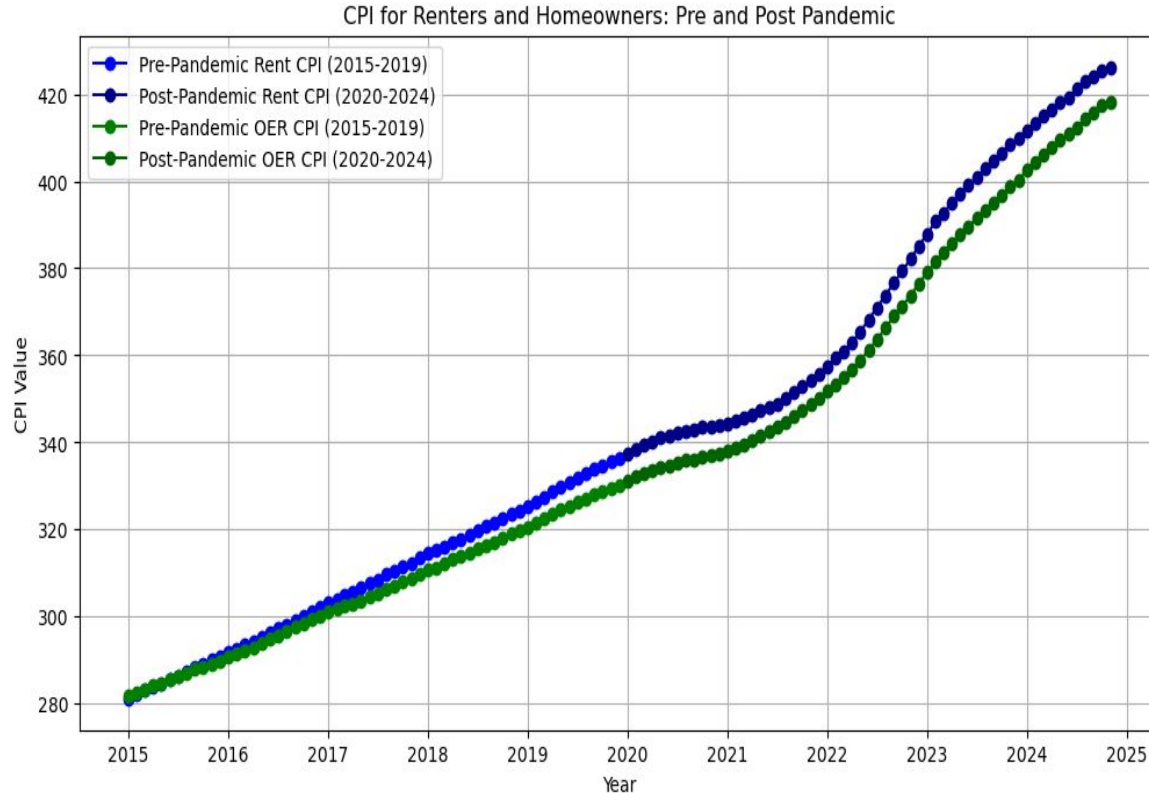
## Correlation

- HPI and foreclosure rates has a correlation coefficient of **-0.83** (closer to 0 and negative) indicating a **strong negative correlation**.



# CPI data shows inflation in housing costs for both renters and homeowners

## Analysis:



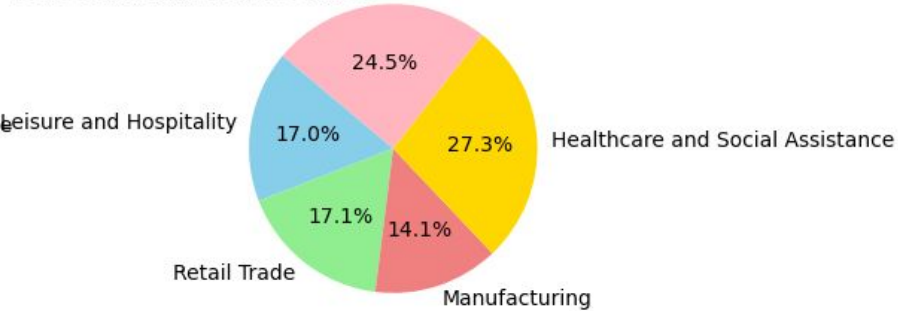
- Renters saw a 5-10% **rent** increase post-pandemic, up from 2-3%, driven by high demand and limited supply. **Utility costs** spiked due to energy disruptions.
- **Homeowners' OER** rose with home prices, while **maintenance costs** grew 10-15% due to labor and material shortages.

# Inflation Affecting Sectors with the Highest Unemployment Rates

Sectoral Unemployment: Pre-Pandemic (2015-2019)  
Professional and Business Services



Sectoral Unemployment: Post-Pandemic (2020-2024)  
Professional and Business Services



## Analysis of top three affected sectors

### Leisure and Hospitality

**Pre-Pandemic:** Unemployment steady at 5%.

**Post-Pandemic:** Spiked to 30% during lockdowns.

**Inflation Impact:** Rising costs for **wages, food, and utility** led businesses to cut jobs or hours. Reduced consumer spending also hurt demand and employment.

### Retail Trade

**Pre-Pandemic:** Unemployment around 4-5%.

**Post-Pandemic:** Rose to 15% due to store closures.

**Inflation Impact:** Higher costs for **goods and transport** increased operating expenses. Reduced consumer spending led to lower sales, causing hiring freezes and layoffs.

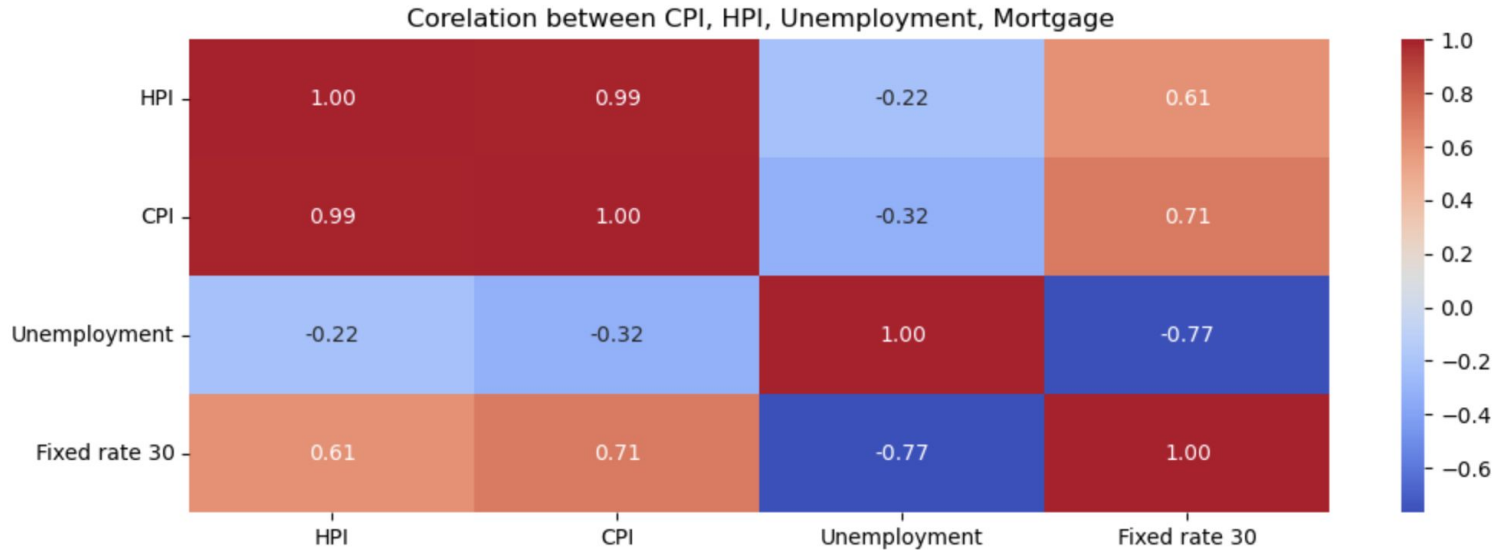
### Manufacturing

**Pre-Pandemic:** Unemployment at 3-4%.

**Post-Pandemic:** Rose to 12-14% due to supply chain disruptions.

**Inflation Impact:** Increased costs of **raw materials and energy** made production more expensive. Companies reduced their workforce to control costs, affecting employment levels.

# Correlation with Mortgage rates (30yr)



## Analysis:

- CPI and HPI show a strong positive correlation with mortgage rates (**0.71 & 0.61**).
- Unemployment and mortgage rates have a strong negative correlation (**-0.77**).

# Additional questions and plan for future development

- Include more control variables for analysis
- Use rolling windows to analyze evolving relationships over time
- Apply advanced models for predictive testing
- Implement lag effects

# Conclusion

Our analysis of inflation trends before and after the pandemic reveals significant shifts in key economic indicators. We observed the impact of inflation on market behavior, housing costs, and employment trends, highlighting the interconnectedness of these factors. The study underscores the importance of continuously monitoring inflation's effects on various sectors, especially housing and the market, to guide informed economic policies.

# Appendix

Github Repo : <https://github.com/xraySMULu/the-big-squeeze>

## Demonstrations:

- **CPI vs S&P 500 Performance Analysis Demo**
  - [https://github.com/xraySMULu/the-big-squeeze/blob/master/Resources/content/cd\\_demo.gif](https://github.com/xraySMULu/the-big-squeeze/blob/master/Resources/content/cd_demo.gif)
- **CPI vs HPI Analysis Demo**
  - [https://github.com/xraySMULu/the-big-squeeze/blob/master/Resources/content/mn\\_demo.gif](https://github.com/xraySMULu/the-big-squeeze/blob/master/Resources/content/mn_demo.gif)
- **Pre- and Post-Pandemic Economic Trends Demo**
  - [https://github.com/xraySMULu/the-big-squeeze/blob/master/Resources/content/la\\_demo.gif](https://github.com/xraySMULu/the-big-squeeze/blob/master/Resources/content/la_demo.gif)
- **CPI vs HPI vs Unemployment vs Mortgage Trends Demo**
  - [https://github.com/xraySMULu/the-big-squeeze/blob/master/Resources/content/xf\\_demo.gif](https://github.com/xraySMULu/the-big-squeeze/blob/master/Resources/content/xf_demo.gif)