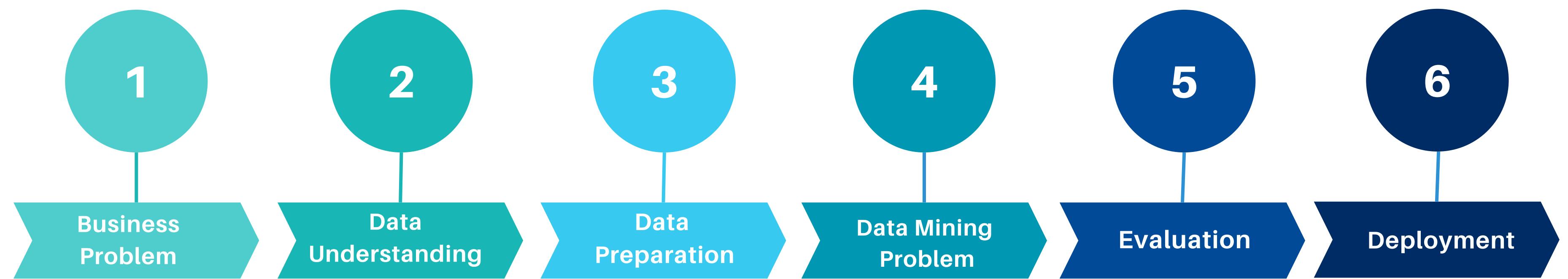


"INFLATION"



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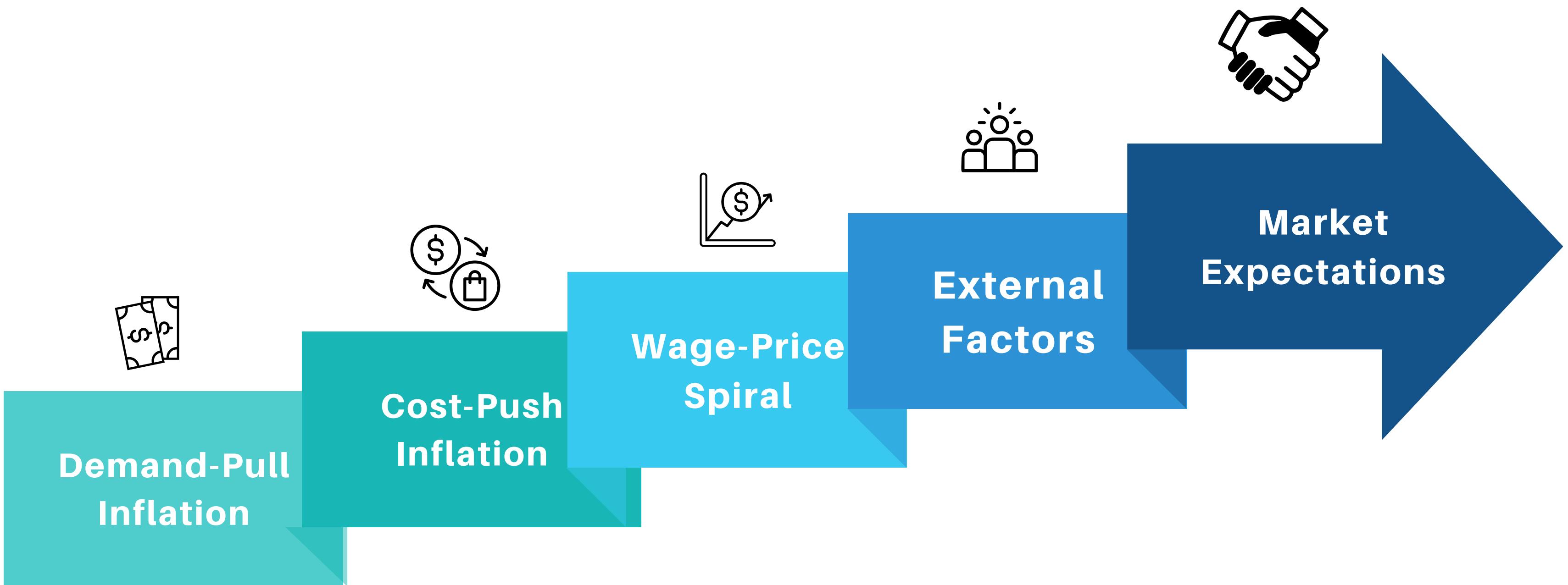


# WHAT IS INFLATION?

Inflation is the rate at which the general level of prices for goods and services rises over time, reducing the purchasing power of money.



# KEY FACTORS AFFECTING INFLATION



# Business Problem

In this project, the business problem is to model the monthly inflation rate for the future using macroeconomic features from the past 19 years.





# DATA UNDERSTANDING

## Data Set

- 228 Total Instances
  - All Numeric, except date.
- 14 Prediction Variables

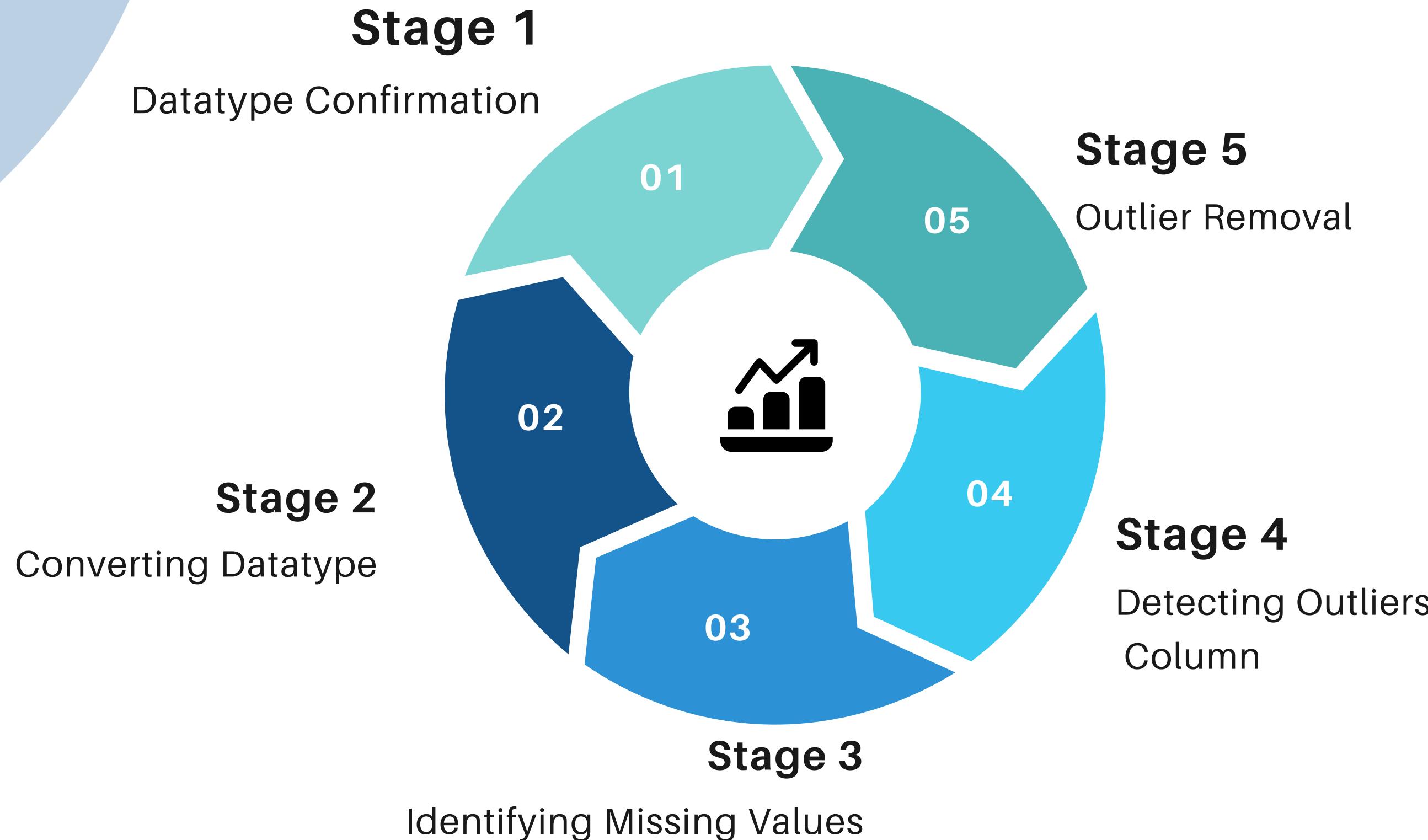
## Target Variable

Core Inflation Rate

## Prediction Variables

- reference\_rate\_NBP
- consumer\_price\_index
- account\_balance
- avg\_monthly\_salary\_enterprise
- avg\_employment\_enterprise
- sold\_production\_industry
- price\_index\_industry
- unemployment\_rate
- EURPLN
- USDPLN
- CHFPLN
- WIG20
- WIG
- WIBOR 3M

# DATA PREPARATION



# Data Mining Approach

To predict the “**Core Inflation Rate**” we are using ***Supervised Modelling Technique*** which are listed below

- ▶ Logistic Regression
- ▶ Decision Tree
- ▶ XG Boost
- ▶ Support Vector Machine
- ▶ K- Nearest Neighbour
- ▶ Naives Bayes
- ▶ Random Forest
- ▶ Ensemble

# Data Mining

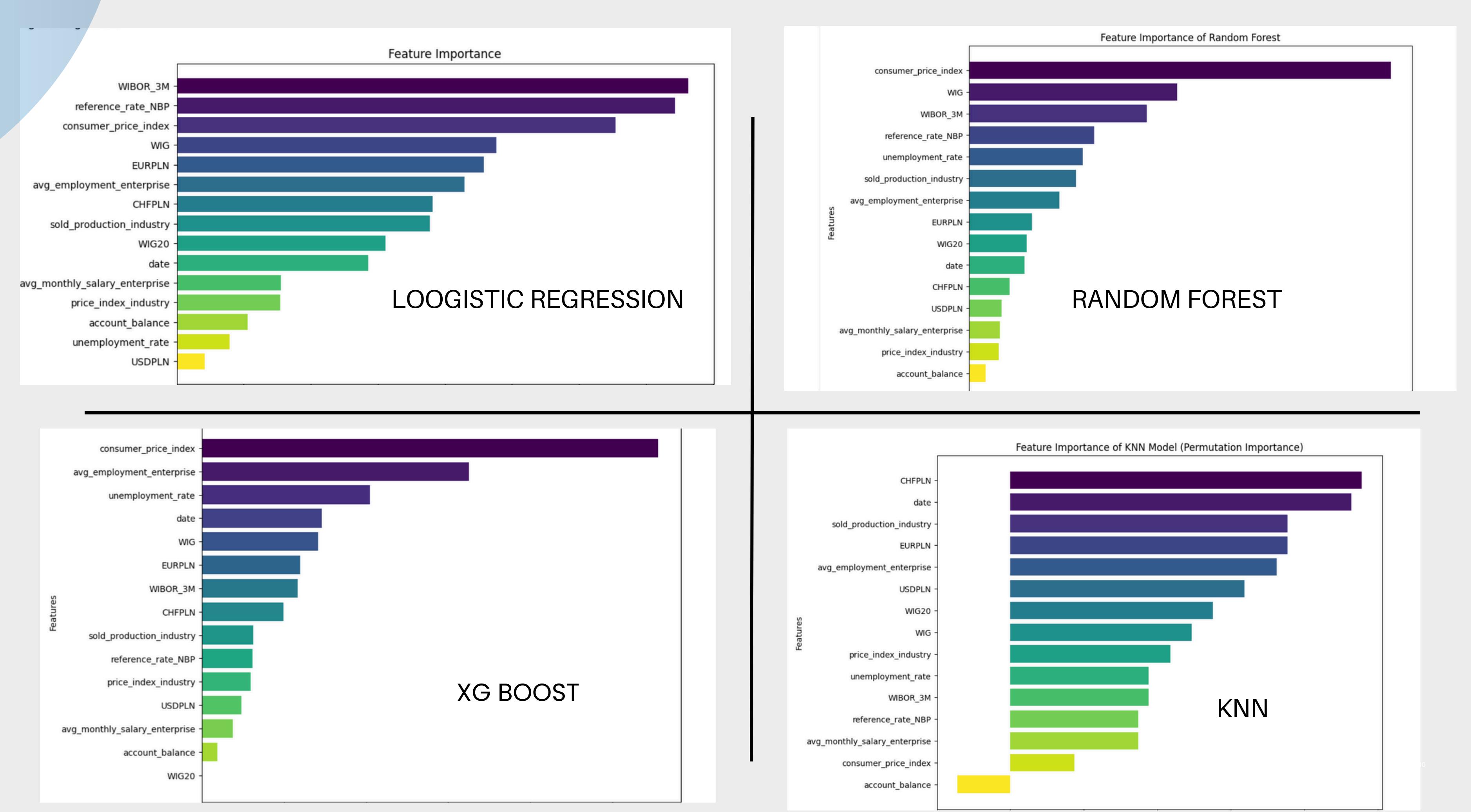
Identify which factors contribute positively and negatively to “Core Inflation Rate”

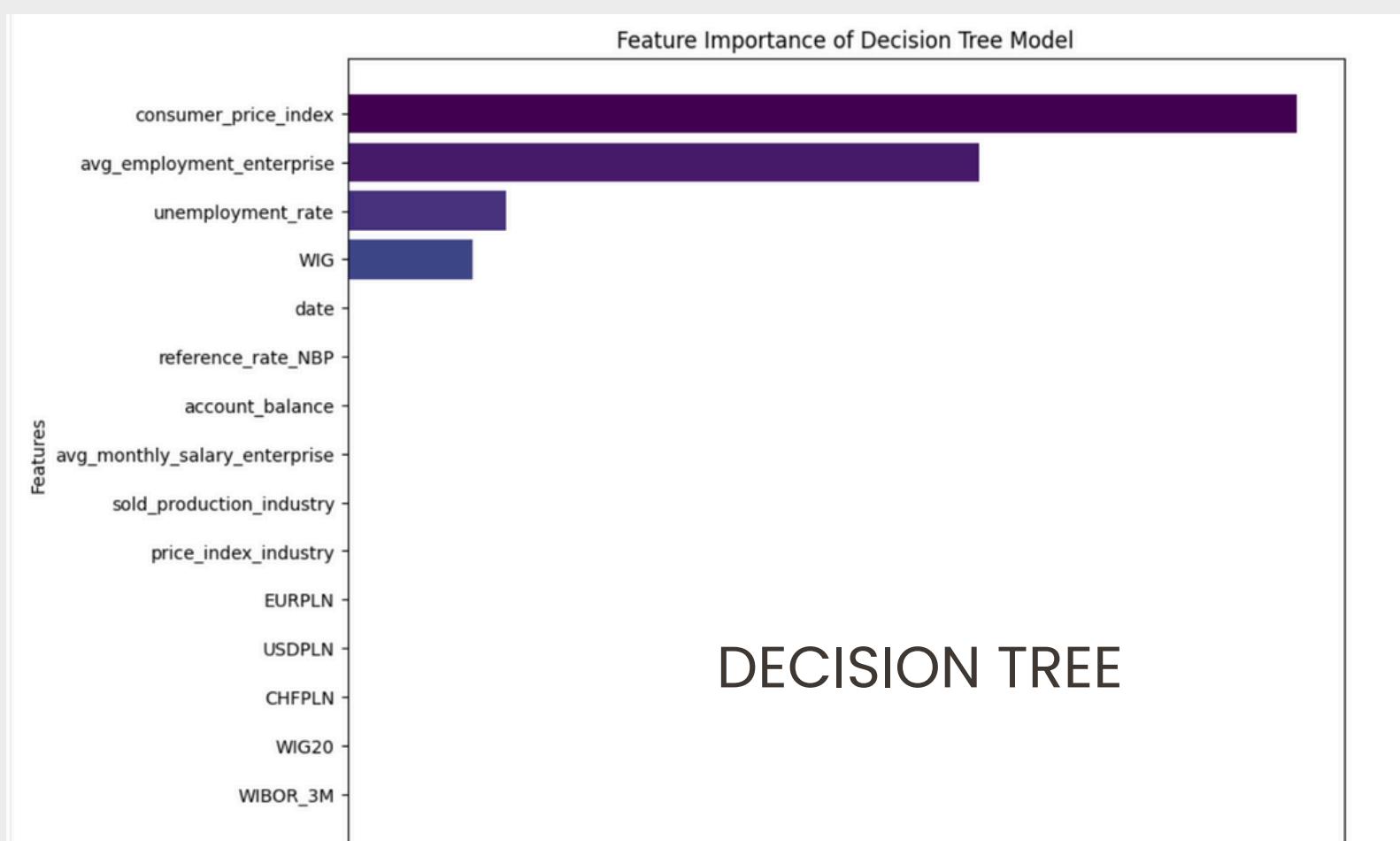
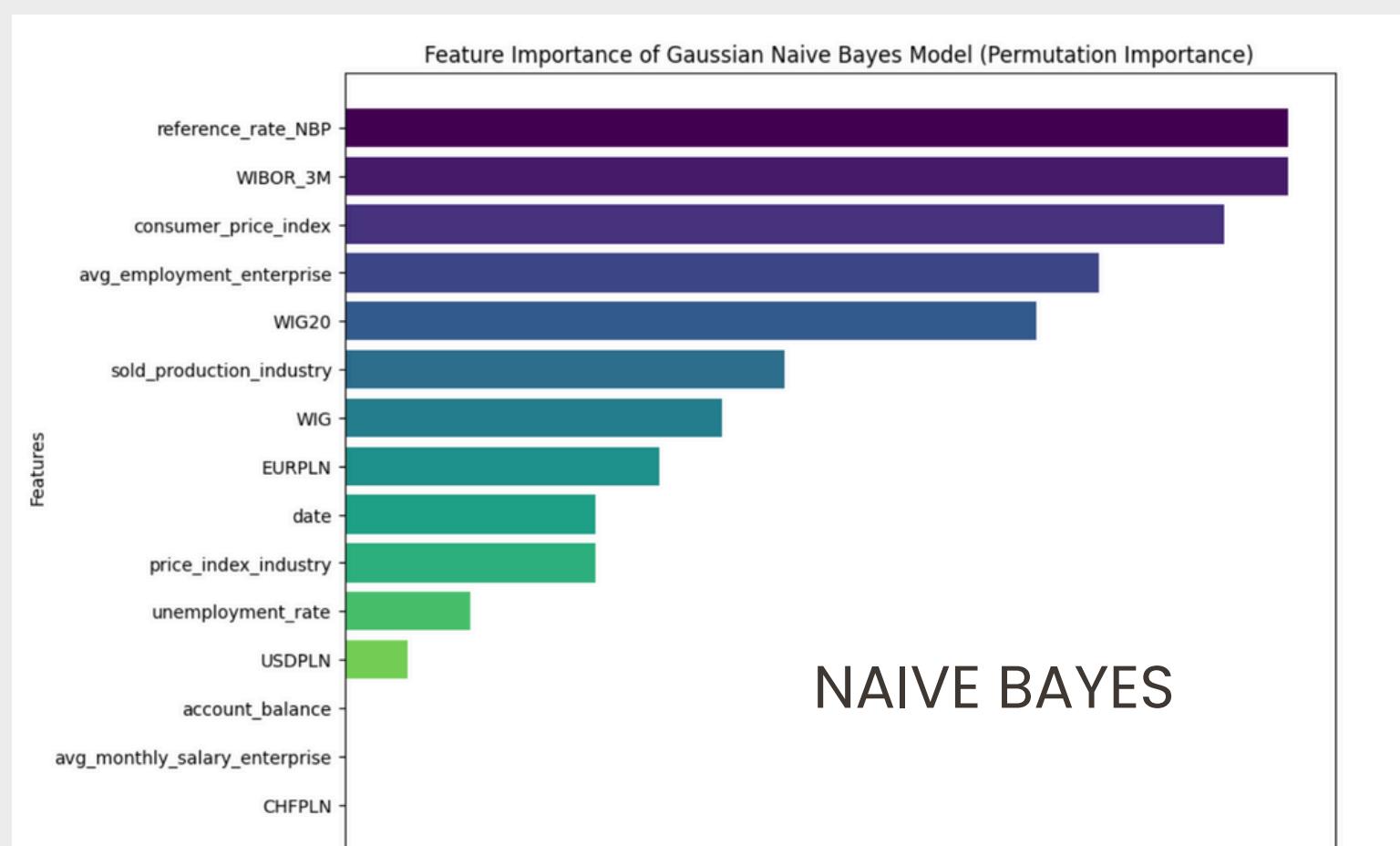
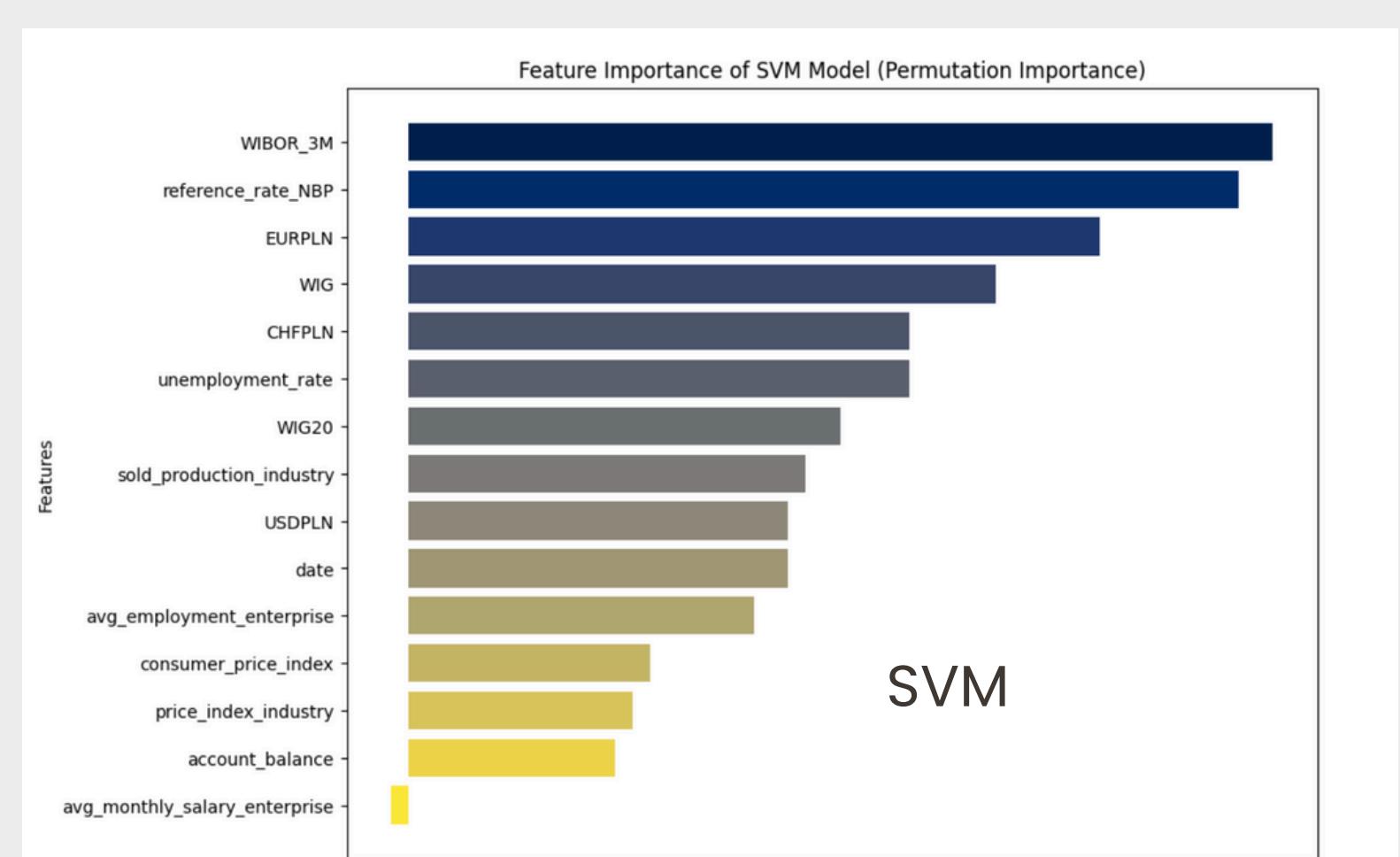
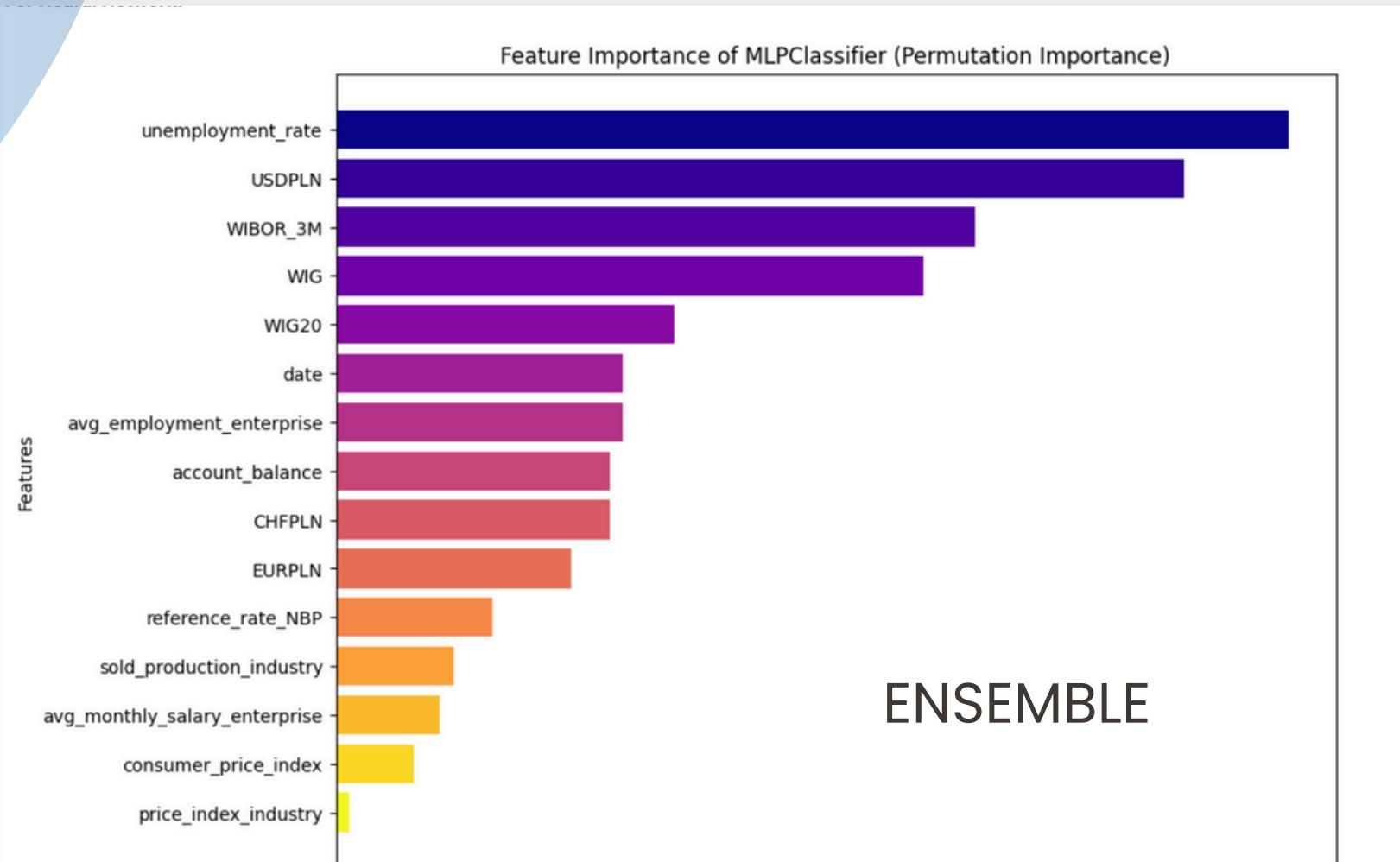
**Short Term  
Goal**

This will be achieved by applying a range of models

**Long Term  
Goal**

To be able to predict our core inflation rate for next month based on the factors(negative, positive)





# Takeaways

Features Important For Inflation

- 1. Consumer Price Index**
- 2. Unemployment Rate**
- 3. WBOR\_3M**
- 4. Reference Rate NBP**

Random Forest, XGBoost, SVM, and  
Logistic Regression

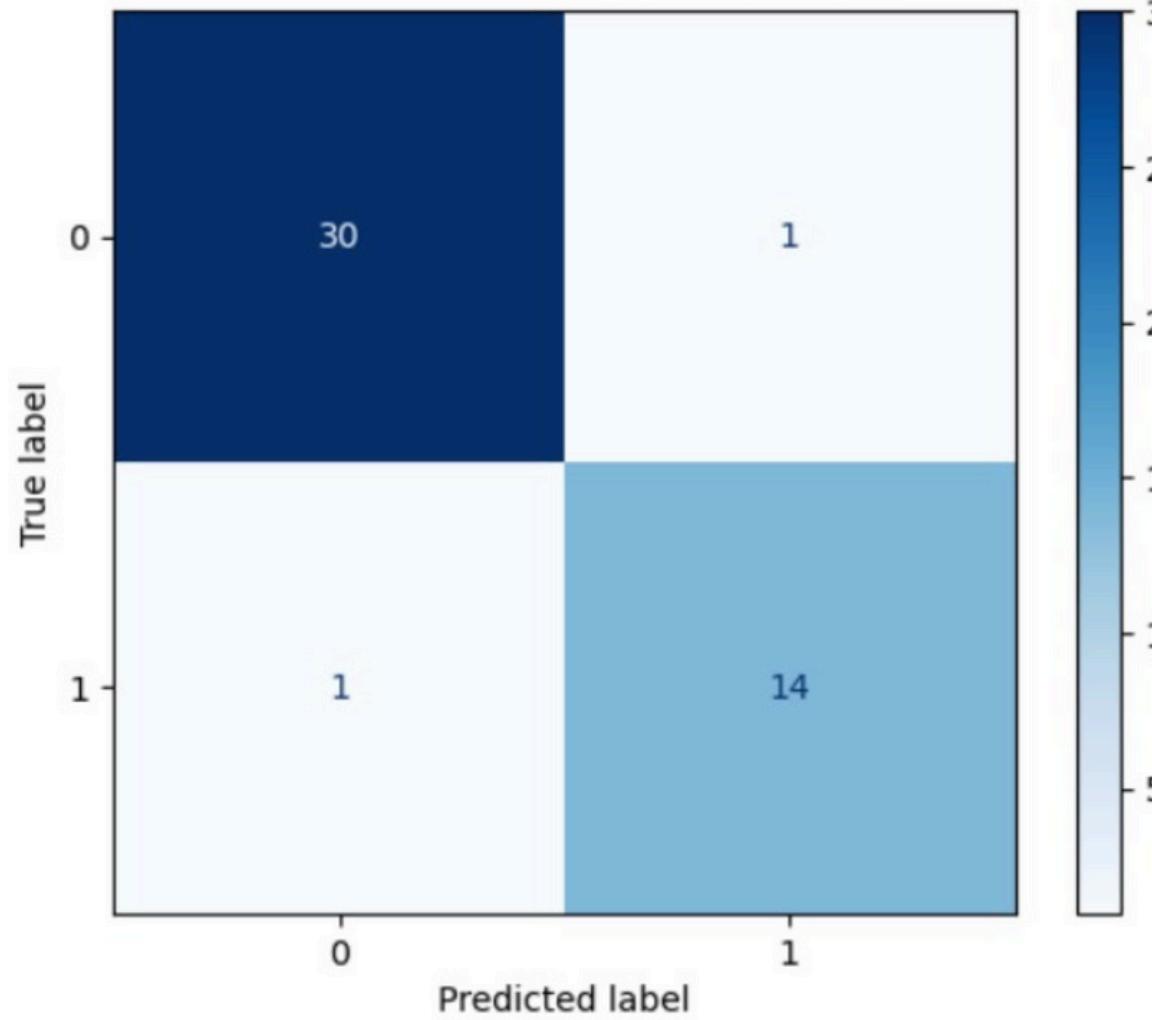


# IDENTIFYING THE WINNING MODEL

Based on *Hyperparameter Tuning*  
and *Cross Hold Validation*  
to Select “Winning Model”

Model	Accuracy	Precision	Recall	F1 Score
Decision Tree	0.87	0.85	0.89	0.87
Logistic Regression	0.91	0.89	0.94	0.91
KNN	0.89	0.87	0.9	0.88
SVM	0.91	0.89	0.94	0.91
Naïve Bayes	0.891	0.87	0.9	0.88
<b>Random Forest</b>	<b>0.96</b>	<b>0.95</b>	<b>0.95</b>	<b>0.96</b>
Gradient Boosting	0.913	0.9	0.9	0.91
Ensembling(Random Forest+Gradient Boosting)	0.913	0.9	0.9	0.91

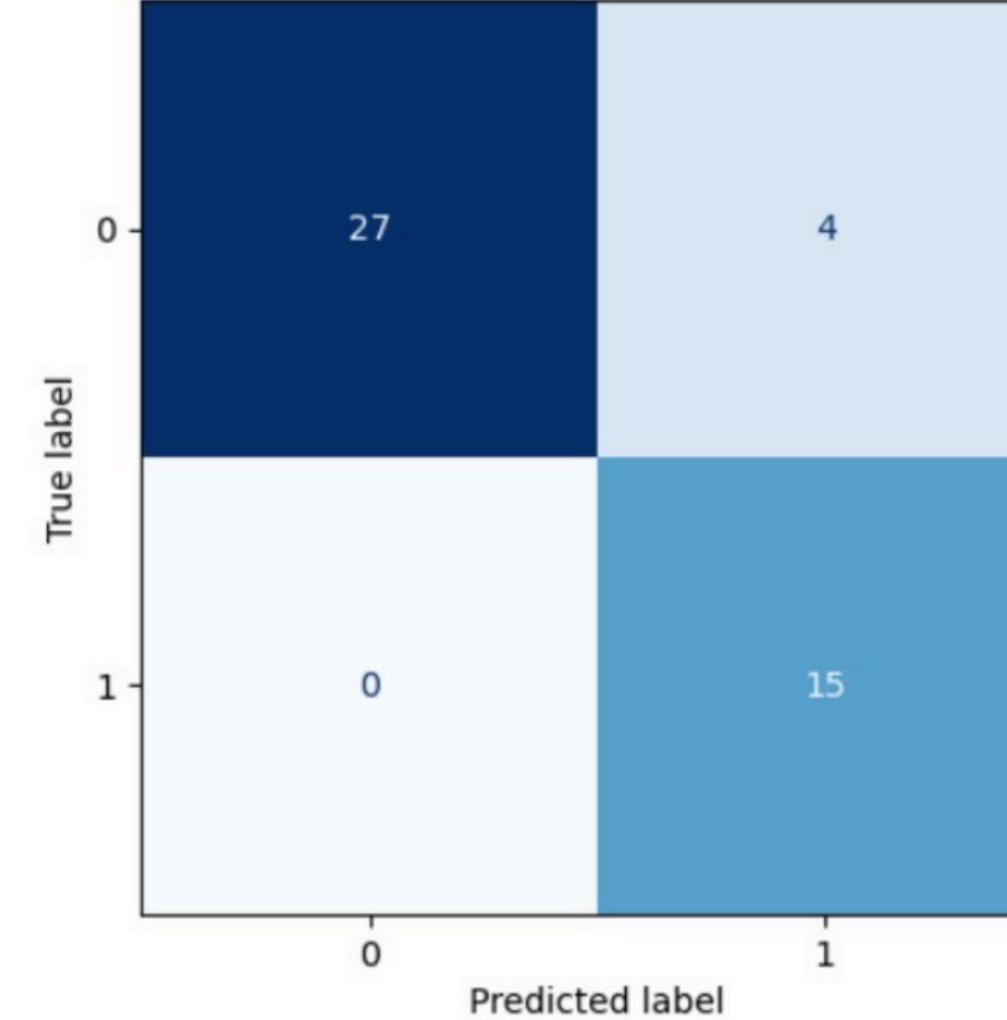
Random Forest Confusion Matrix



## RANDOM FOREST

Recall=TP/TP+FP

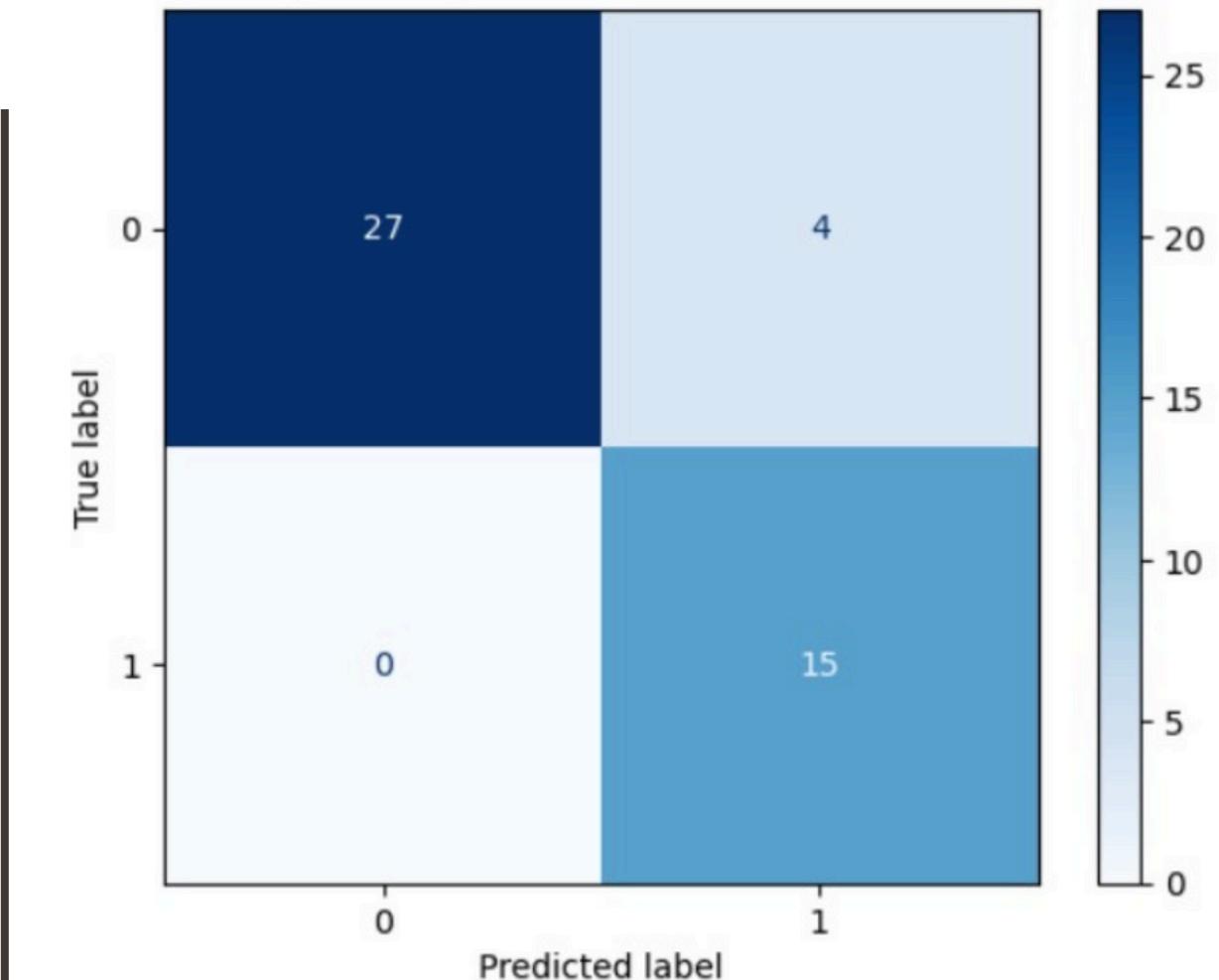
SVM Confusion Matrix



## SVM

Min FN, Max TP

Logistic Regression Confusion Matrix

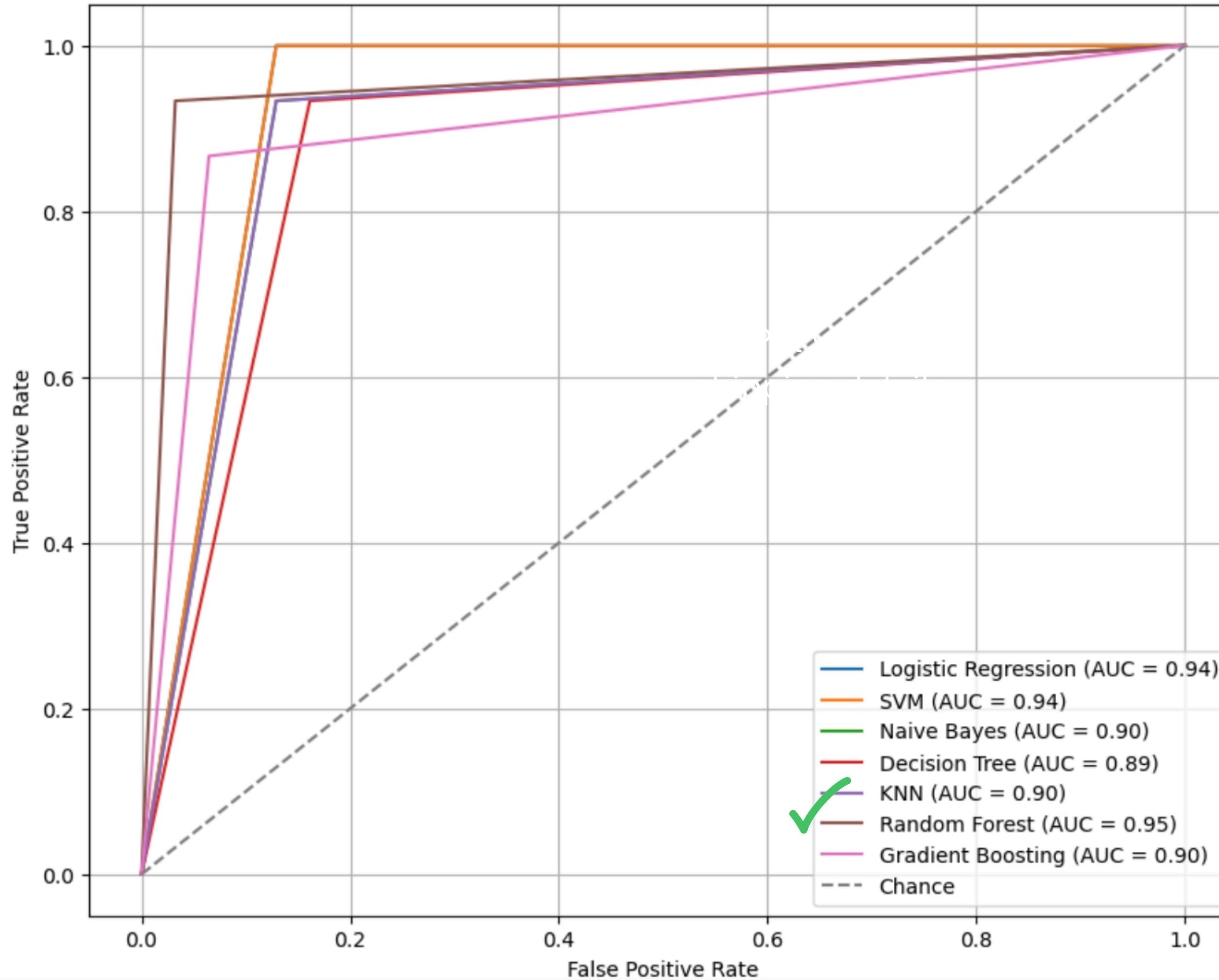


## LOGISTIC REGRESSION

F1 Score  
Harmonic Mean(Recall + Precision)

# ROC

ROC Curves for All Models



# Tips and Insights

What every investor needs to know

01

Economic Drivers of Inflation (WIBOR\_3M,  
Consumer Price Index, Reference Rate NB)

02

Random Forest provides the best balance of  
accuracy and interpretability

03

Potential Applications (economic forecasting, policy  
decisions)



# DEPLOYMENT



## Implementation

Implementation the model into a dashboard or API for policymakers and business analysts to make future predictions



## Frequent Updates on Data

Data updates and retrain the model periodically and train the data(e.g., monthly)



## Periodic Model Testing

Test the model which we have trained so that we can make accurate predictions

# Deployment Challenges

Always think long-term.

**New data could not be incorporated**

**Handling New Situations**

**Policy Timing**





Poland Core Inflation Rate (I:PCIR)

VAL  
2.90%



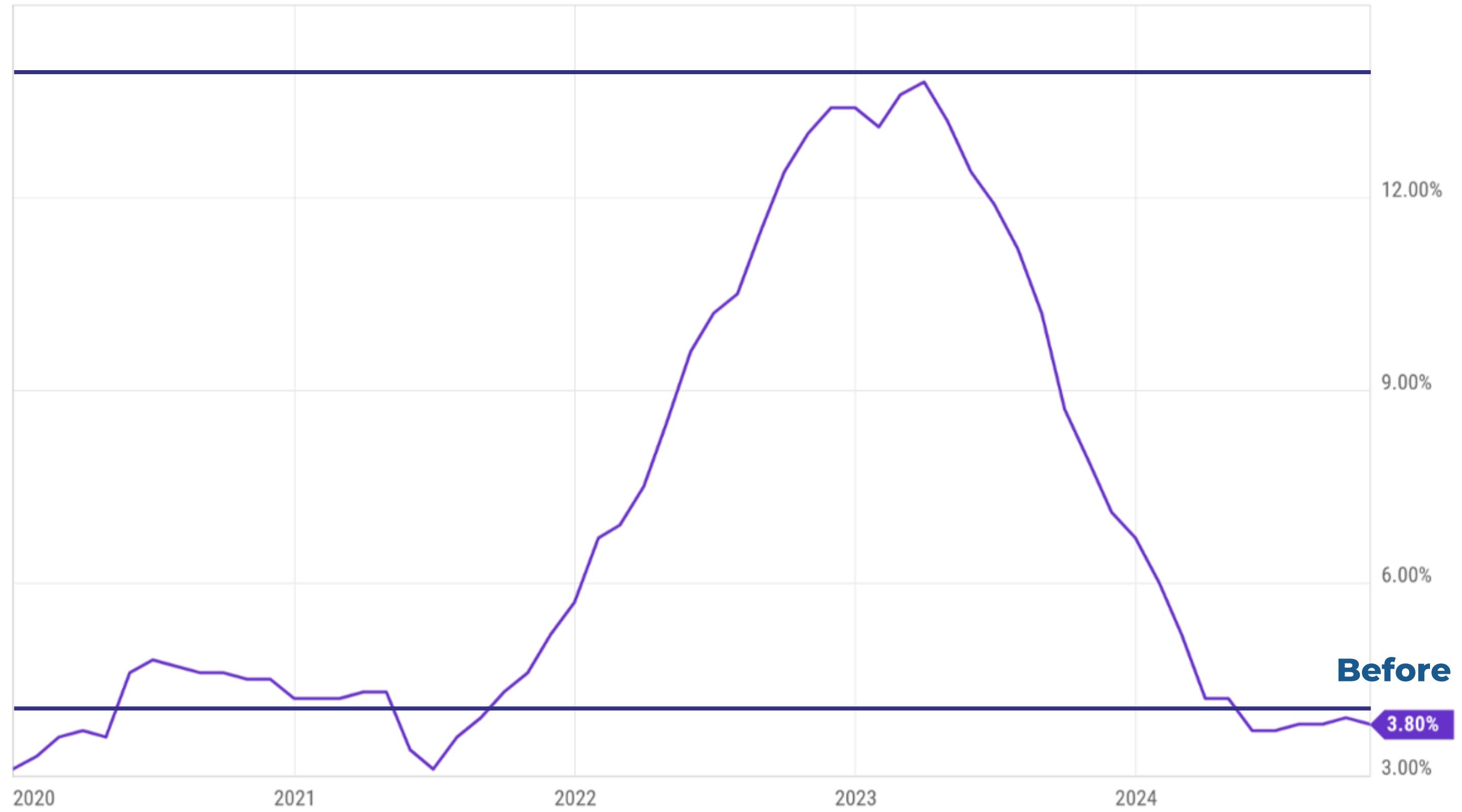
# Challenges

## Before

Poland Core Inflation Rate (I:PCIR)

VAL  
3.80%

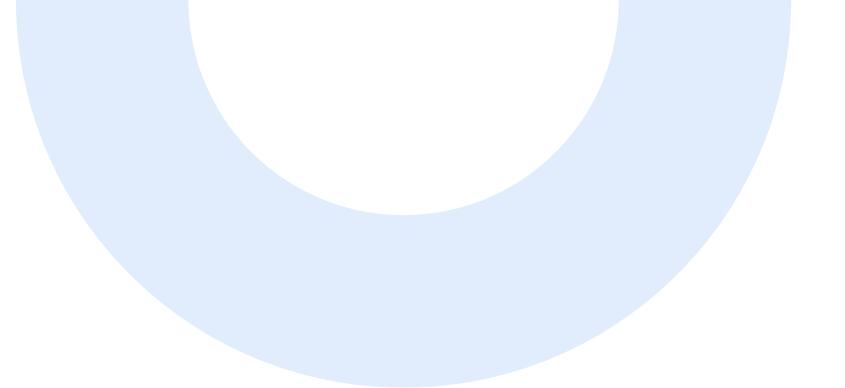
After



Before

3.80%

20



# Reasons for increase in Core Inflation Rate



## Wage Growth

Impact on production costs and consumer prices.



## Energy prices

In normal case core inflation ignores volatile factor like energy cost. But rising energy prices indirectly affected the prices of goods and services



## Geopolitical Tensions

COVID-19, Russia-Ukraine Conflict causing SC disruptions



# Thank You!!

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## Team Members

- **Anwesha Banerjee**
- **Satyanand Eranki**
- **Alvin Lee**
- **Xuzhou Feng**
- **Qinxin Zhang**