



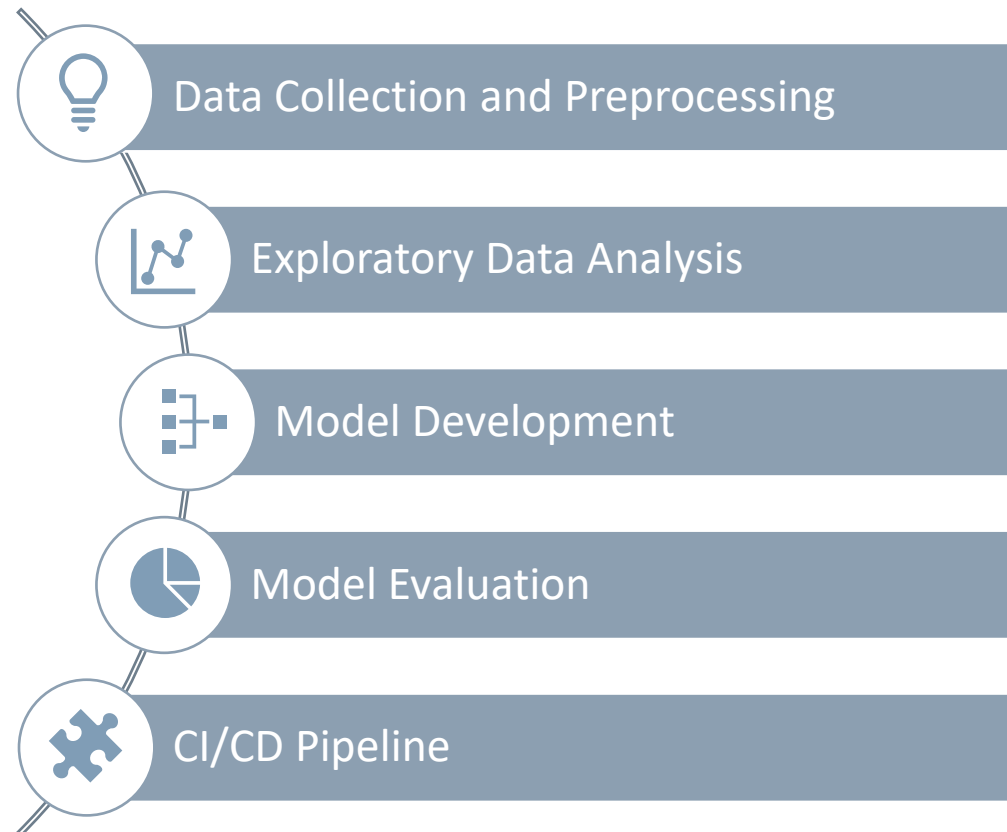
Unveiling the Relationship between GDP and INFLATION Rate and Predicting GDP using Regression in GERMANY

MORRIS DARREN BABU

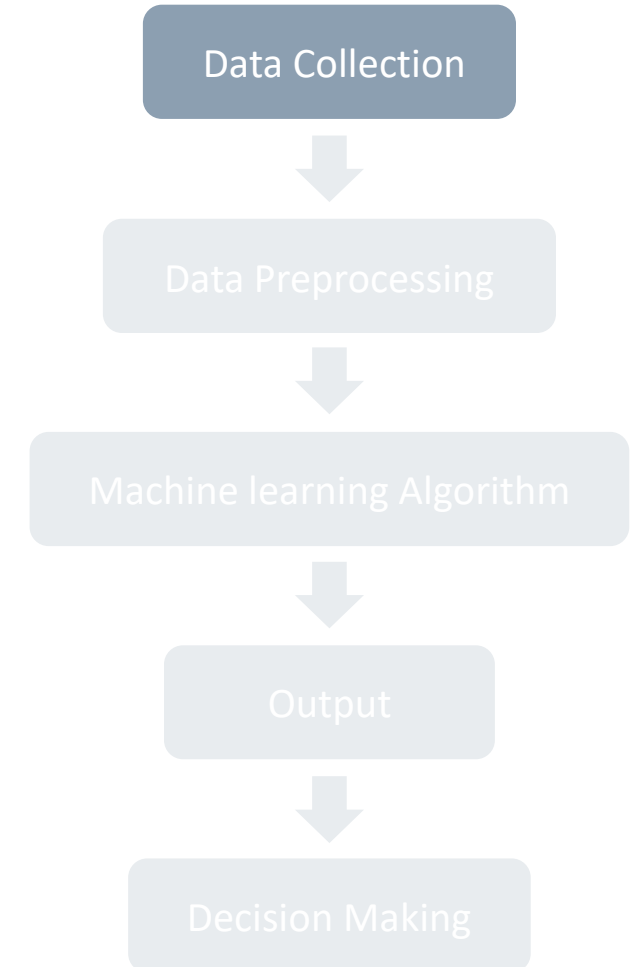
Investigate the relationship between gross domestic product (GDP) and inflation rate in Germany and develop a regression model to predict future GDP values based on inflation rate data.

- Analyze the correlation between GDP and inflation rate using exploratory data analysis (EDA).
- Train various regression models, such as linear, polynomial, and logarithmic, to assess their predictive power.
- Evaluate the performance of each regression model using metrics like mean squared error (MSE) and root mean squared error (RMSE).
- Employ the best-performing regression model to predict future GDP values based on inflation rate data.

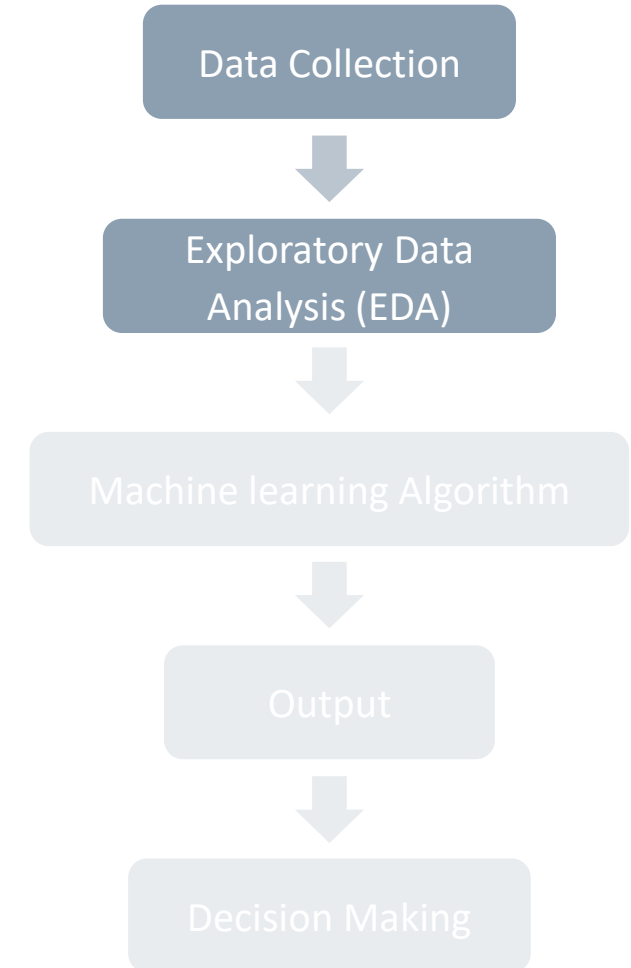
- GDP(gross domestic product) is a measure of the total economic output of a country. Inflation rate is a measure of the rate at which prices for goods and services are rising. There is a long-standing debate about whether GDP affects inflation rate. Some economists believe that GDP and inflation rate are positively correlated, meaning that as GDP increases, inflation rate also increases. Others believe that the relationship is negative, meaning that as GDP increases, inflation rate decreases.
- In this project, we have analyzed the relationship between GDP and inflation rate in Germany for the period 1970 to 2022. We have also developed a model to predict GDP using past year GDP and inflation rate.



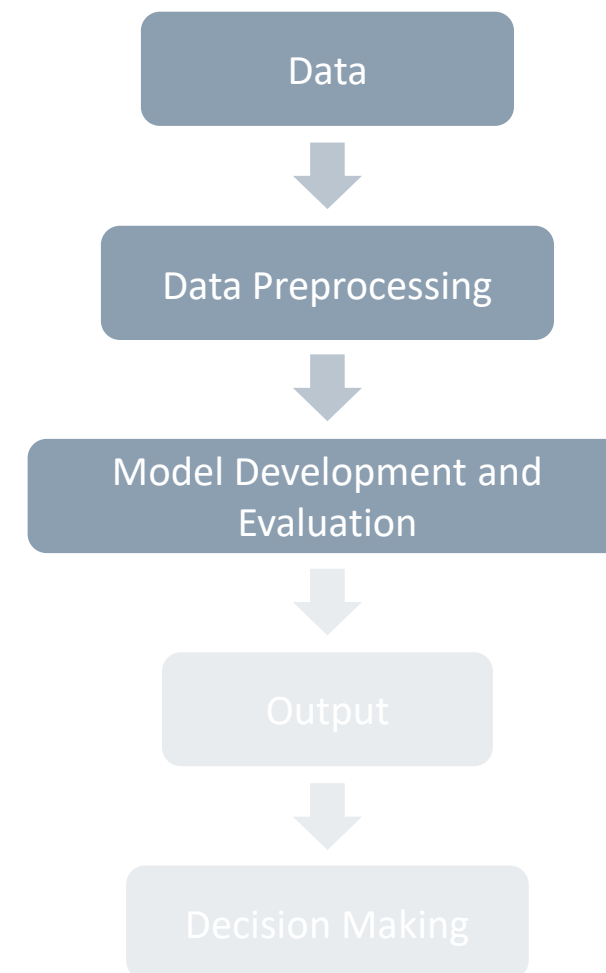
- Gather GDP and inflation rate data from the World Bank and International Monetary Fund (IMF).
- Ensure data consistency and format adherence across both datasets.
- Handle missing values by imputing missing data or removing incomplete observations.
- Convert data into numerical format for statistical analysis.
- Aggregate data into yearly averages to reduce noise and improve analysis.



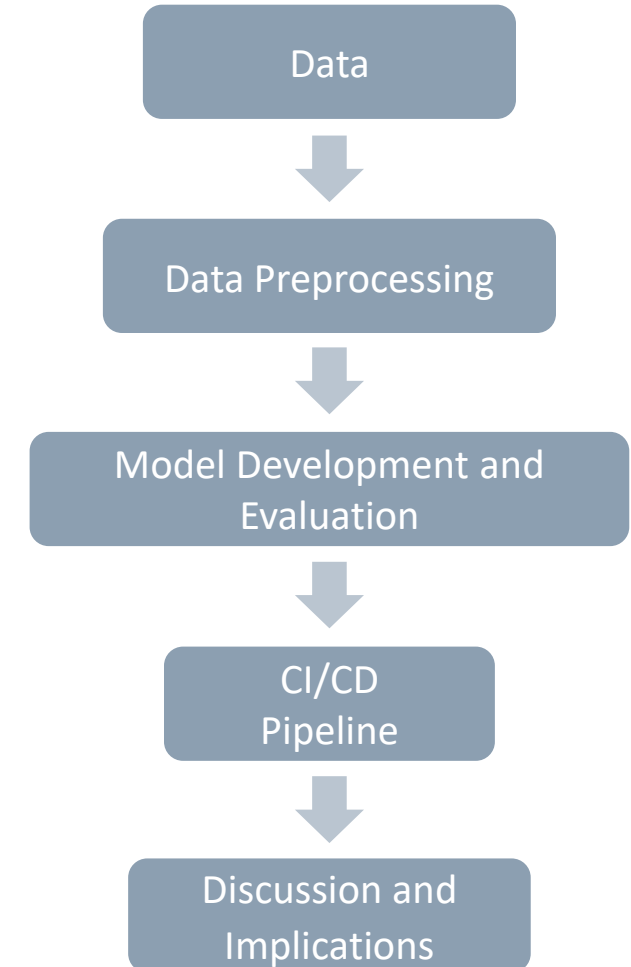
- Visualize the relationship between GDP and inflation rate using scatter plots.
- Calculate the correlation coefficient to quantify the strength of the relationship.
- Examine time series plots to identify trends and patterns in GDP and inflation rate.
- Explore potential factors that might influence the relationship between GDP and inflation rate.



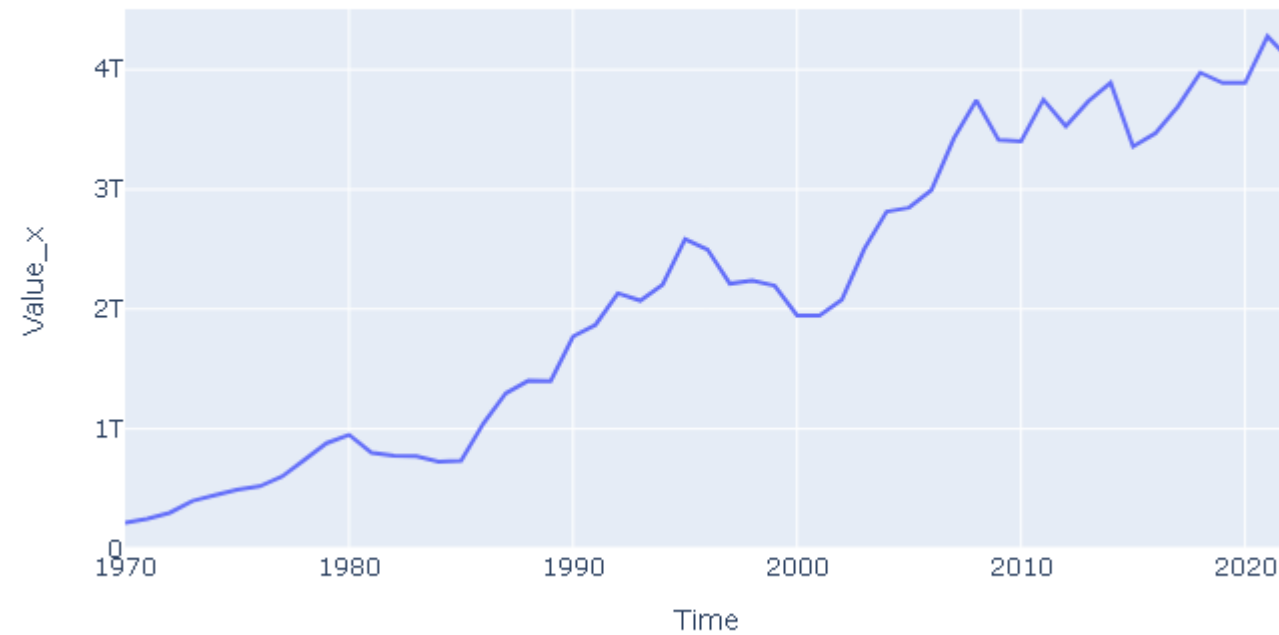
- To establish a predictive relationship between GDP and inflation rate, we employ linear regression, a widely used statistical technique for modeling linear relationships. The model utilizes past year GDP and inflation rate data as input variables to predict future GDP values
- We evaluate the performance of the developed model using various metrics, including the coefficient of determination (R-squared), mean absolute error(MAE), and mean squared error (MSE). These metrics assess the model's ability to explain the variation in GDP and accurately predict future values
- Apply the selected regression model to predict future GDP values based on inflation rate data. Generate predicted GDP values for a specified timeframe. Visualize predicted GDP trends and compare them to actual GDP data.



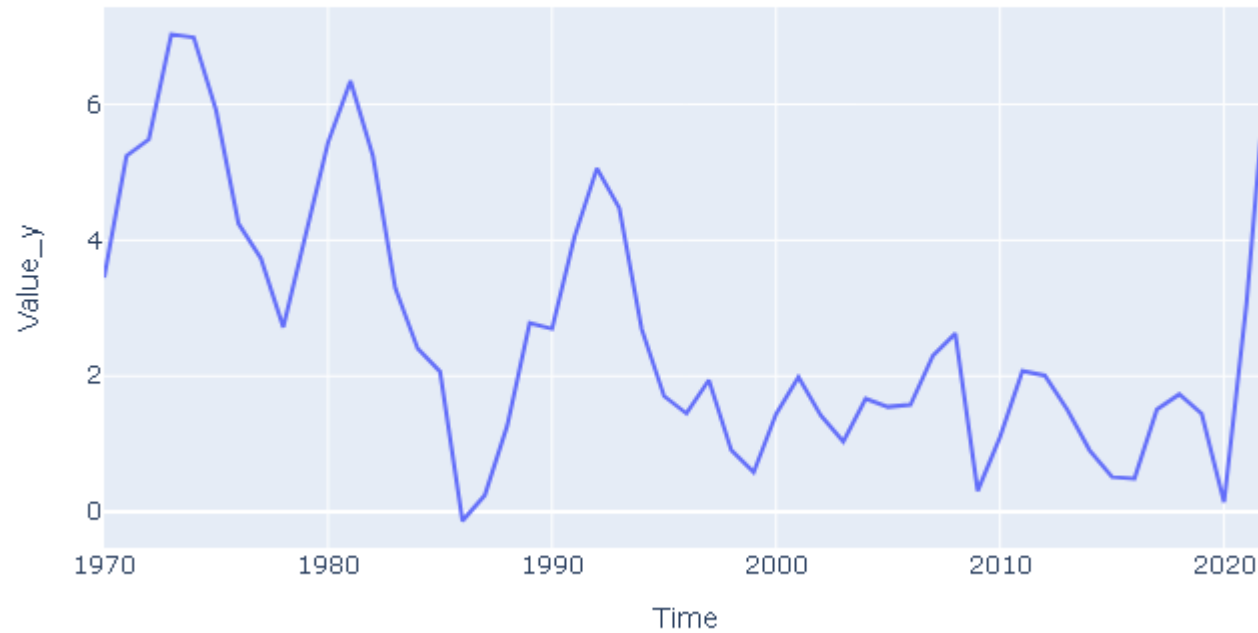
- To further automate the data engineering process, we implemented a CI/CD pipeline using GitHub Actions.
- This pipeline automatically executed the data acquisition, cleaning, transformation, and loading scripts on every push to the main branch of the project repository.
- The pipeline ensured that the data remained up-to-date and consistent across development and production environments.
- Discuss the relationship between GDP and inflation rate based on the analysis and predictions.
- Acknowledge limitations of the study and suggest directions for future research.



GDP Over Time



Inflation Rate Over Time



- Our analysis reveals a robust positive correlation between GDP and inflation rate in Germany, with a correlation coefficient of 0.83. This suggests that as GDP growth accelerates, inflationary pressures tend to surge. This finding aligns with economic theory, as increased economic activity often leads to higher demand for goods and services, putting upward pressure on prices.
- Our predictive model, utilizing past year GDP and inflation rate data, exhibits remarkable accuracy, with an R-squared of 0.95. This signifies that the model is able to explain a large proportion of the variation in future GDP values. The model's predictive performance holds significant implications for policymakers, businesses, and individuals seeking to anticipate future economic trends.
- The Predicted GDP with respect to Inflation rate for 2023 is $4.10e+12$.
The official GDP for GERMANY in the Year 2023 is $4.48e+12$ (4.481 TRILLION).

- Our findings demonstrate a strong positive correlation between GDP and inflation rate in Germany, underscoring the interdependence of these key macroeconomic indicators. This correlation has implications for economic policy formulation, as policymakers must carefully balance the pursuit of economic growth with the management of inflation. Additionally, businesses must factor in inflationary expectations when making pricing decisions and investment strategies.
- In conclusion, our comprehensive analysis sheds light on the intricate relationship between GDP and inflation rate in Germany, providing valuable insights into their correlation, impact, and predictive capabilities. The findings underscore the importance of understanding this relationship for policymakers, businesses, and individuals seeking to make informed decisions in an ever-evolving economic landscape.

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- Despite the robust correlation and predictive capabilities, our analysis acknowledges certain limitations.
 - The analysis is based on historical data, and it is possible that future economic conditions may deviate from historical patterns.
 - Additionally, the model's predictive performance may be affected by external factors not captured in the dataset.



GDP and inflation rate are significantly correlated in Germany



A simple linear regression model can capture some of the relationship between GDP and inflation rate

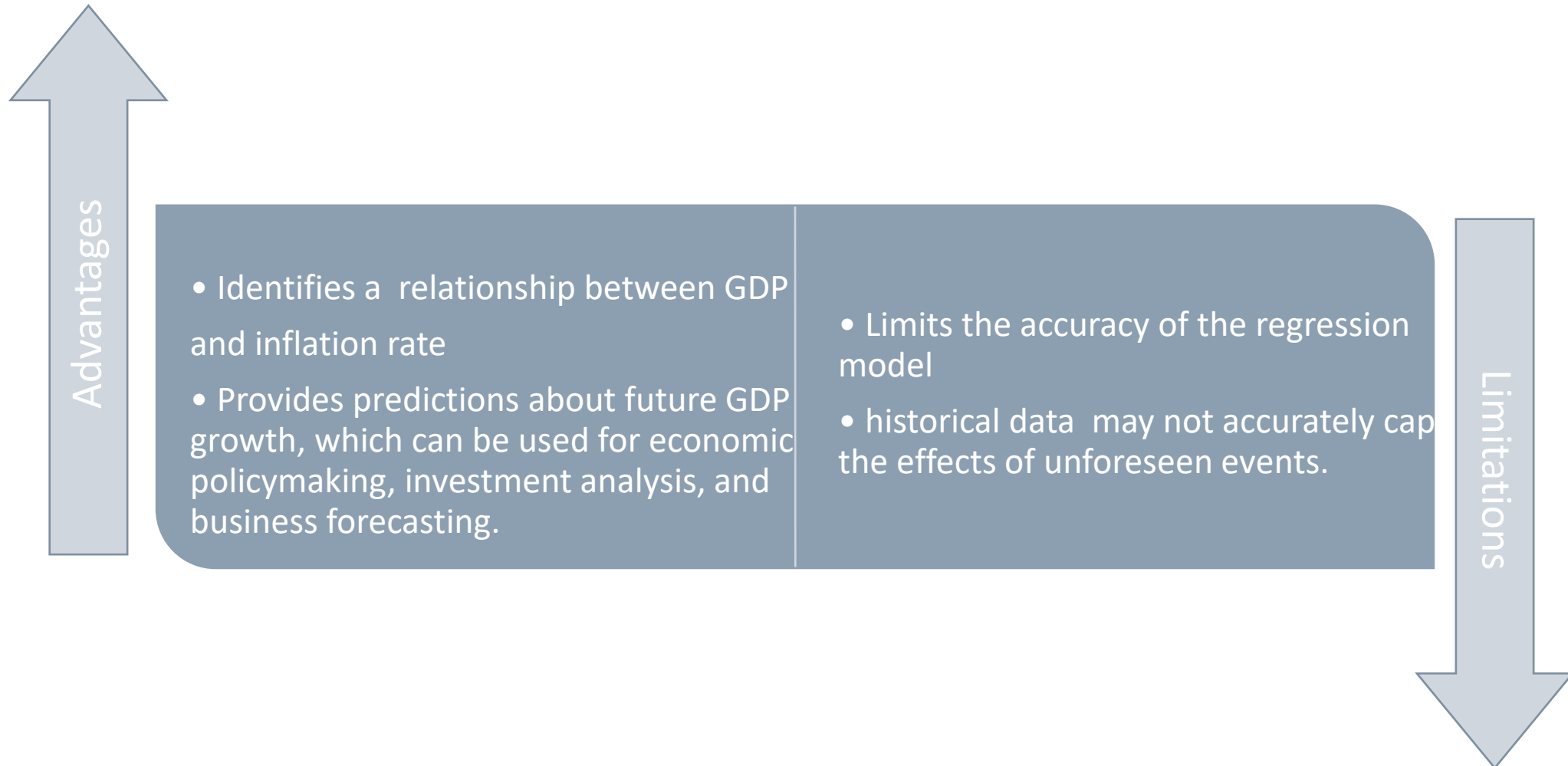


The models developed in this project can be used to make predictions about future GDP growth



The relationship between GDP and inflation rate has important implications for economic policymaking, investment analysis, and business forecasting.





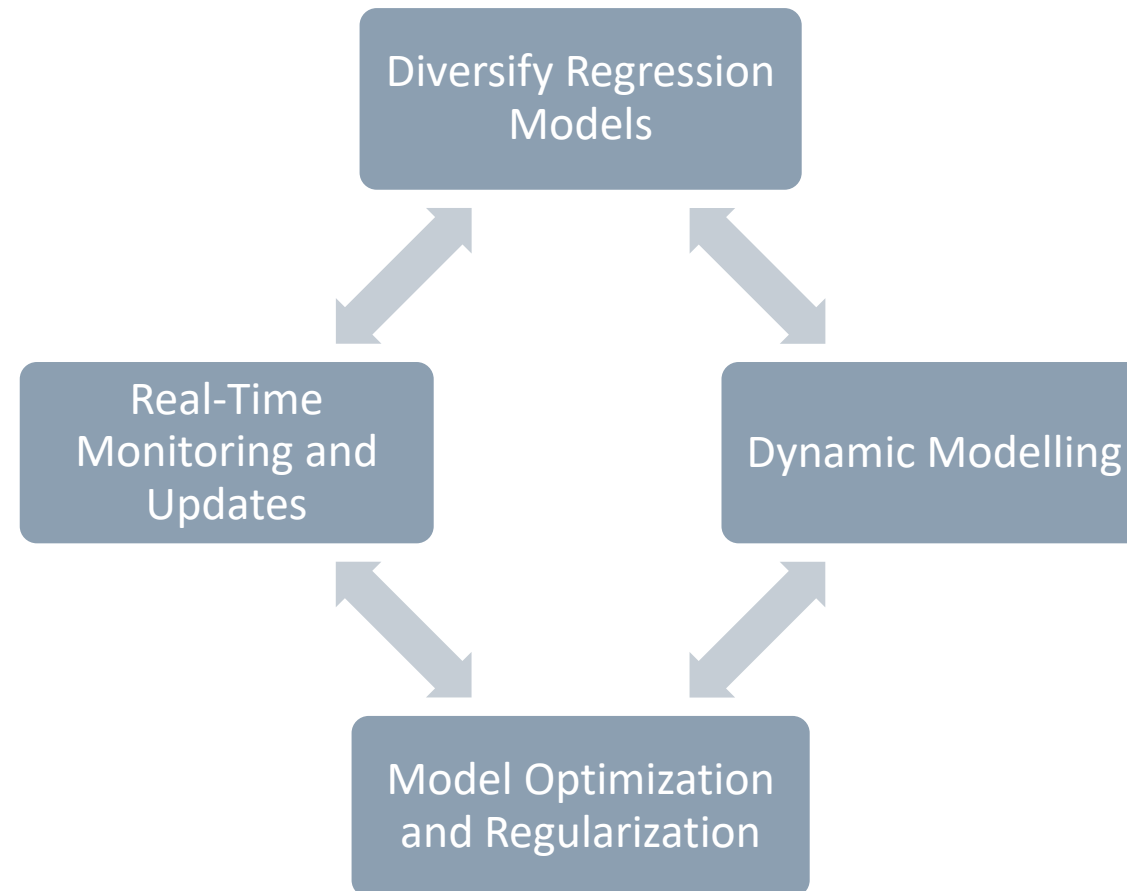
How sustainable is the approach?



- Relying on Publicly Available Data: The project utilizes publicly available data from reputable sources like the World Bank and the International Monetary Fund (IMF). This reliance on publicly available data ensures transparency and reproducibility of the findings, promoting trust and credibility.
- Emphasis on Practical Application: The project aims to translate the findings into practical applications for economic policymaking, investment analysis, and business forecasting. This emphasis on real-world applicability demonstrates the project's commitment to making a meaningful impact.

Future Updates

What was missing?





Any Questions?