# STAT 429 Final Project Proposal

**--Analyzing Factors and Predictive Modeling for ZRX to USD Exchange Rate Fluctuations**

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**Introduction:**

This analysis seeks to explore the determinants of exchange rate from ZRX to USD using regression analysis, incorporating multiple independent variables beyond time alone. The aim is to identify significant predictors of change rate movements and forecast future rates with enhanced accuracy.

**Nature of data:**

The dataset consists of time series data for the ZRX to USD ($) cryptocurrency pair from 2022-2-27 to 2024-02-27 obtained from the official BITFINEX website. This data includes exchange rate metrics such as daily highs and lows, average prices, last traded rates, and buying/selling prices. Given that 0x Protocol (ZRX), a cryptocurrency, plays a protocol role in open-source infrastructure enabling decentralized exchange of ERC20 tokens across various blockchains, the ZRX to USD exchange rate reflects the market dynamics and trading activities surrounding this protocol.

Here is the column definition of the data:

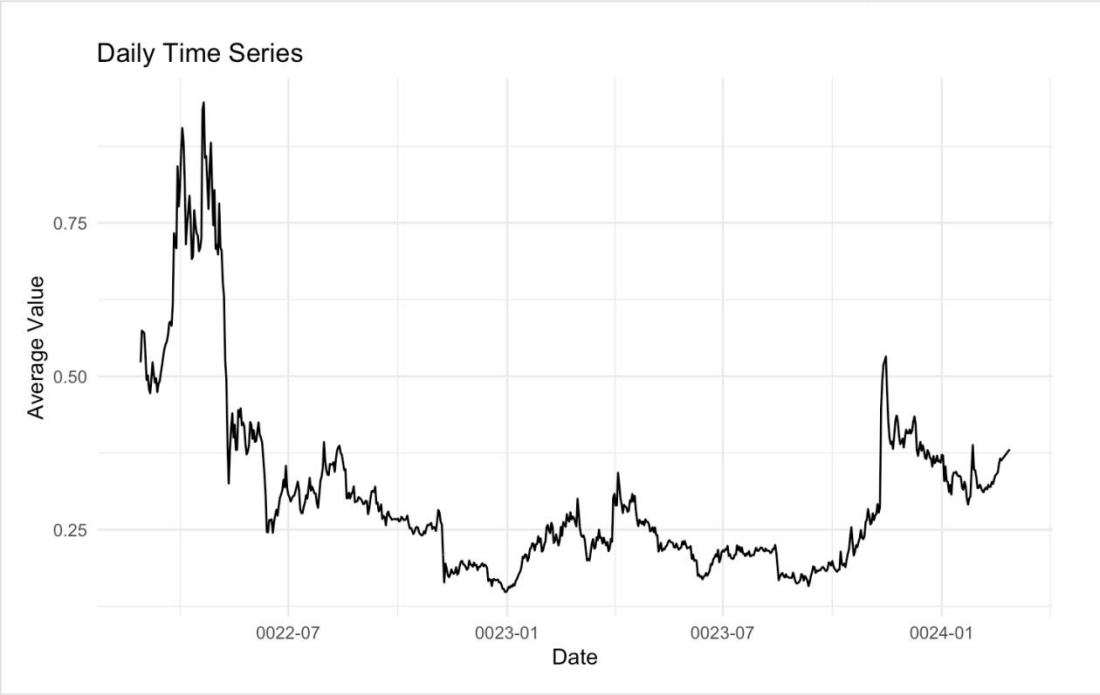
| column | description | type |
|---|---|---|
| code | Unique cryptocurrency exchange pair identifier. | String |
| date | Date of record. | Date |
| high | Highest daily price. | Double |
| low | Lowest daily price. | Double |
| mid | Average daily price. | Double |

| column | description | type |
|---|---|---|
| last | Last traded price. | Double |
| bid | Buying price at end of day. | Double |
| ask | Selling price at end of day. | Double |
| volume | Trading volume at end of day. | Double |

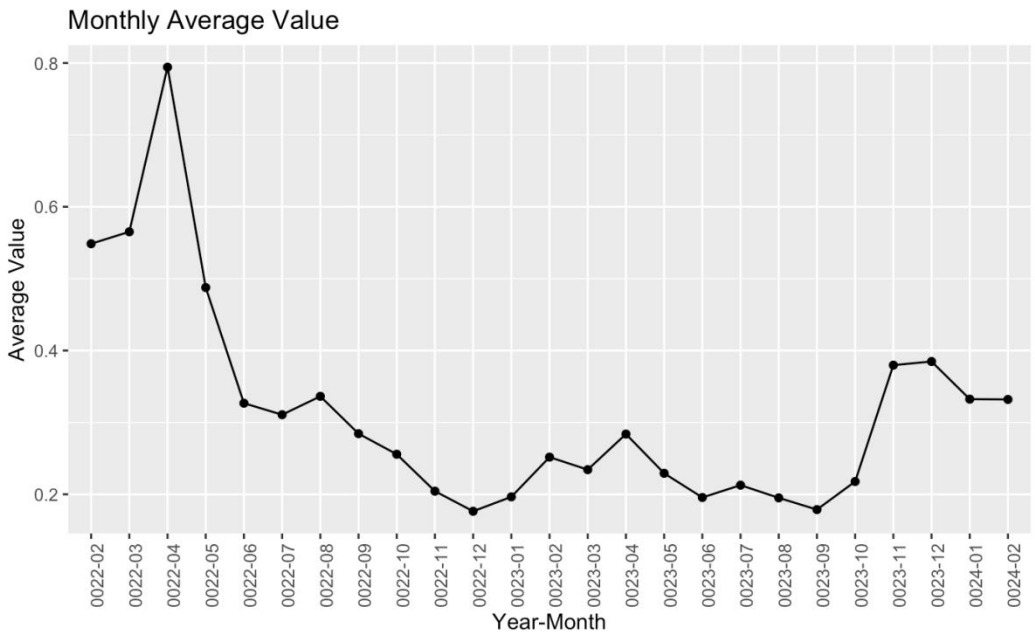
**Questions to address:**

- What are the key factors driving the fluctuations in the ZRX to USD exchange rate over time? This could involve examining correlations trading volumes and buying or selling price.
  Particularly, we would like to know:
  - How do trading volume and buying/selling activities correlate with changes in the ZRX to USD exchange rate over time?
  - Are there specific periods or patterns were trading volume or buying/selling behaviors exert more significant influence on the exchange rate?
- Can the ZRX to USD exchange rate be predicted using time series regression models? By analyzing historical data and identifying significant predictors, we can assess the feasibility of building predictive models to forecast future movements in the exchange rate.

**Time Series Plot and Any Other Visual Presentations:**




*The daily time series plot displays the fluctuations in average value over time on a daily basis, beginning from 2022-2-27 to 2024-02-27. The pattern suggests non-stationarity due to the changes in mean and variance over time, highlighting periods of potential market events or external influences impacting daily values.*




*The monthly average value plot traces the average value across several months, starting from February in the year 2022 to February of 2024. This representation smooths out the daily fluctuations seen in the first graph, providing a clearer view of the longer-term trend and potential seasonality. Initially, there is a dramatic decrease followed by a trough, after which the average values oscillate at a lower level with some upward movement towards the middle of the timeline. This plot could suggest a potential cyclical behavior or seasonality on a yearly basis, although further analysis is required to confirm any seasonal patterns.*

**Plans for Analysis: Analysis A**

1. Preliminary Analysis:

   Data Source: The dataset originates from a reputable financial data source, ensuring the reliability and timeliness of the information.

   Time Series Plot: An initial visualization has been performed to identify any apparent trends, seasonal effects, or anomalies in stock prices and potential predictors.

   Preliminary Observations: Examination of trends, variance patterns, and potential no stationarities the need for data transformation or differencing.

2. Regression Analysis:

   Selection of Independent Variables: At least three independent variables will be chosen based on their potential influence on ZRS and USD rate according to the availability in the dataset. We currently choose the time, trading volumes and buying or selling prices. We will test the collinearity of the variables using VIF and correlation analysis.

   Regression Model Suggestions: Two or more regression models will be proposed, each incorporating time, time squared and time cubed and the selected independent variables as predictors.

   Model Fitting and Analysis: The proposed models will be fitted to the data, and the results will be analyzed in terms of coefficient significance of R^2, and diagnostic plots. We will also do the residual analysis to review the efficiency of models.

   Regression with Autocorrelated Errors: If residual analysis (via p/ACF plots) indicates autocorrelation, models with autocorrelated errors will be considered to improve model adequacy.

   Final Model Selection: The best model will be chosen based on statistical criteria and the quality of residual diagnostics.

   Forecasting: The selected model will be used to forecast the next five values of the stock prices, providing insights into expected future movements.