FINANCIAL BARS

and their

PREDICTIVE POWER

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Overview

PART 1

What are Bars?

Why do we need Bars?

Categories of Bars

Types of Standard Bars

PART 2

Comparison through Empirical Evidence

PART 3

Time Series Modelling with Bars

What are **Bars?**

What are Bars?

Market Data aggregated

over certain interval or condition

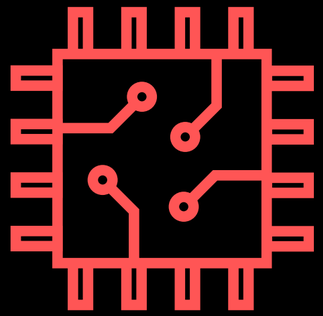
In Financial Machine Learning,
ROW in Table

3,500	+17.45	50	175	42,000	39.87	4.99	0.49
47.5	+7.95	15,531,500	718,070	72,461	78.17	9.24	1.04
15	+7.14	13,494,200	196,665	19,200	38.04	0.89	1.19
75.25	+6.74	11,934,900	880,792	75,250	49.12	11.15	0.23
390	+6.56	75,000	28,417	8,580	7.49	1.49	0.29
102	+6.25	2,977,900	299,538	14,280	27.54	9.80	1.33
12.2	+6.09	38,483,800	463,680	36,600	55.65	29.74	0.43

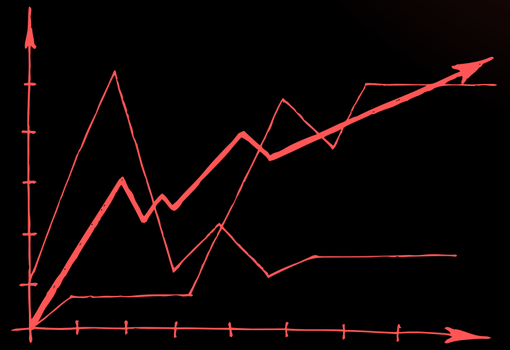
Why do we need **Bars?**

Bars help tackle the following challenges

billions of
data points



computationally
expensive



prone to
external noise

Categories of **Bars**

Categories of Bars

Standard

Aggregate Data based on fixed, externally defined contraints

Do not account for Market Dynamics like price changes & volatility

Examples,
Time, Tick, Volume, etc.

Information-driven

Sample Data only when new information arrives in the market

Information refers to Trading imbalance on buy & sell sides

Examples,
Tick/ Volume Imbalance, etc.

Types of **Standard Bars**

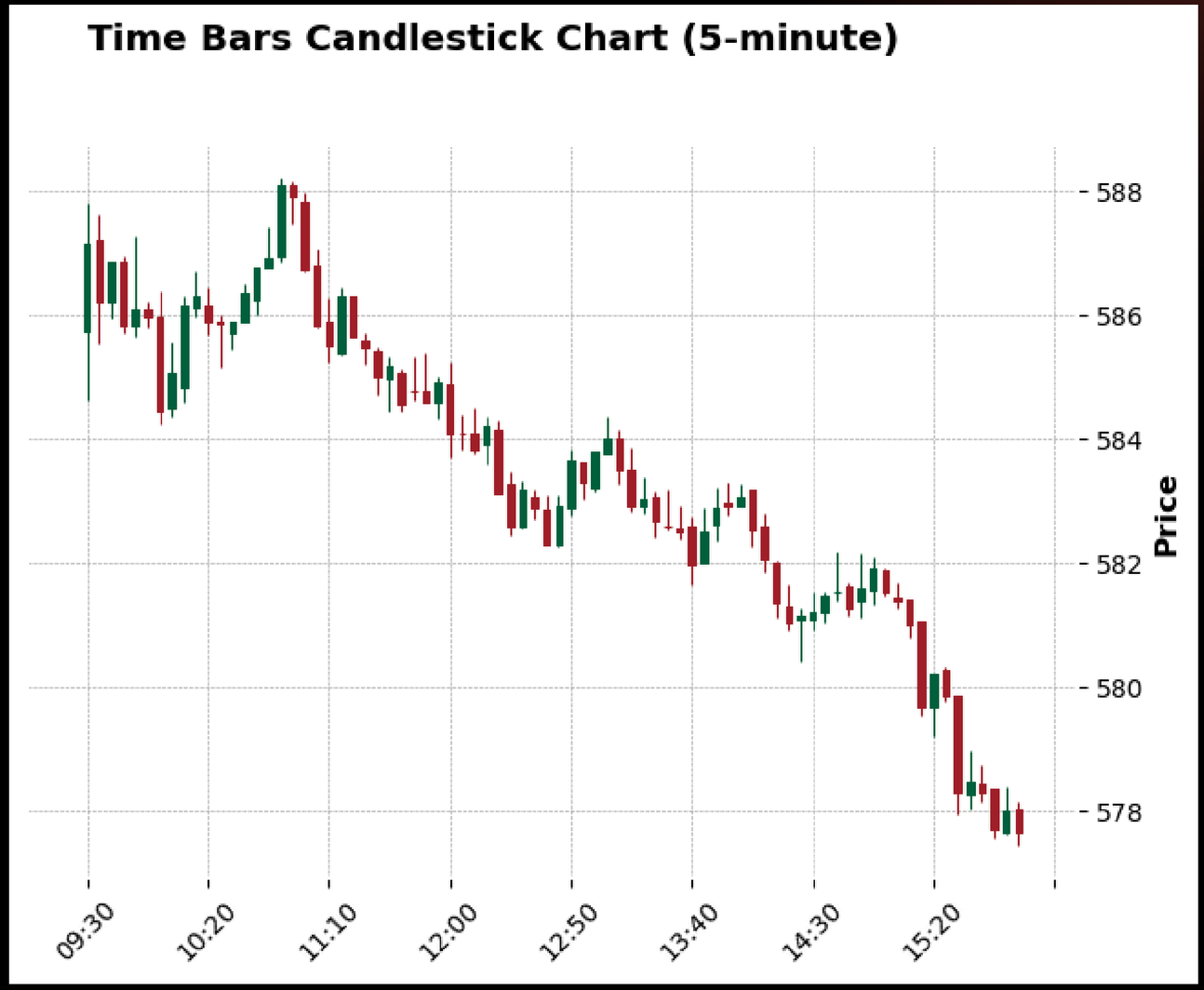
Time Bars

Sampling Market data at fixed time intervals

Demerits -

- Oversamples low-frequency periods
- Undersamples high-frequency periods

- Time-sampled series exhibit poor statistical properties like heteroscedasticity, serial correlation, etc.



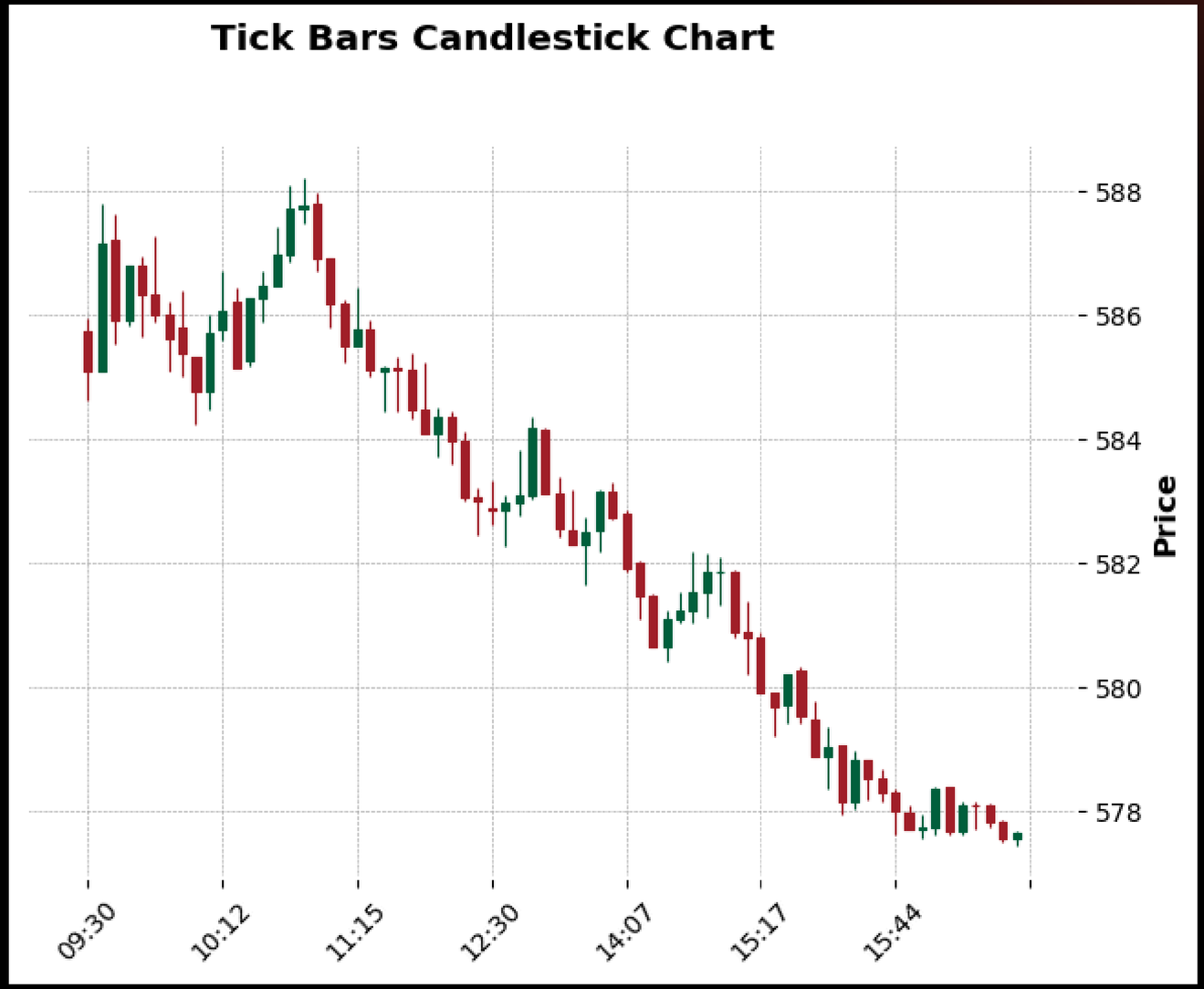
Tick Bars

Sampling Market data after specific number of transactions (500 executions in the graph)

Higher clustering of Bars in peak hours

Demerits -

- Treats micro trades the same as large block trades
- Sensitive to outlier price-values

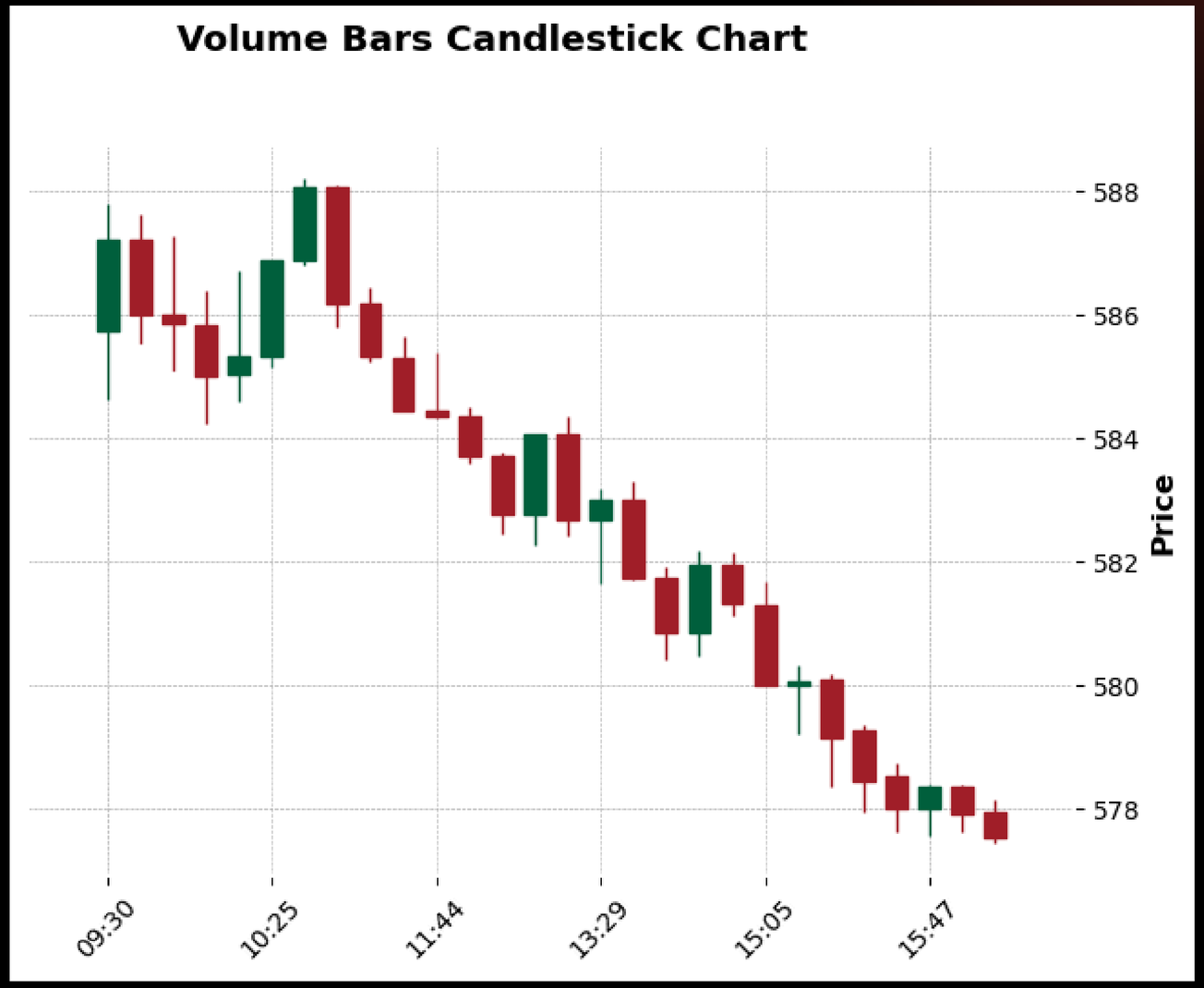


Volume Bars

Sampling Market data after specific volume of the asset is traded (100,000 units in the graph)

Rationale-

- More receptive to Market Activity
- Orders may be broken down by matching protocols, thereby distoring the trend
- closer to IID Gaussian Distribution

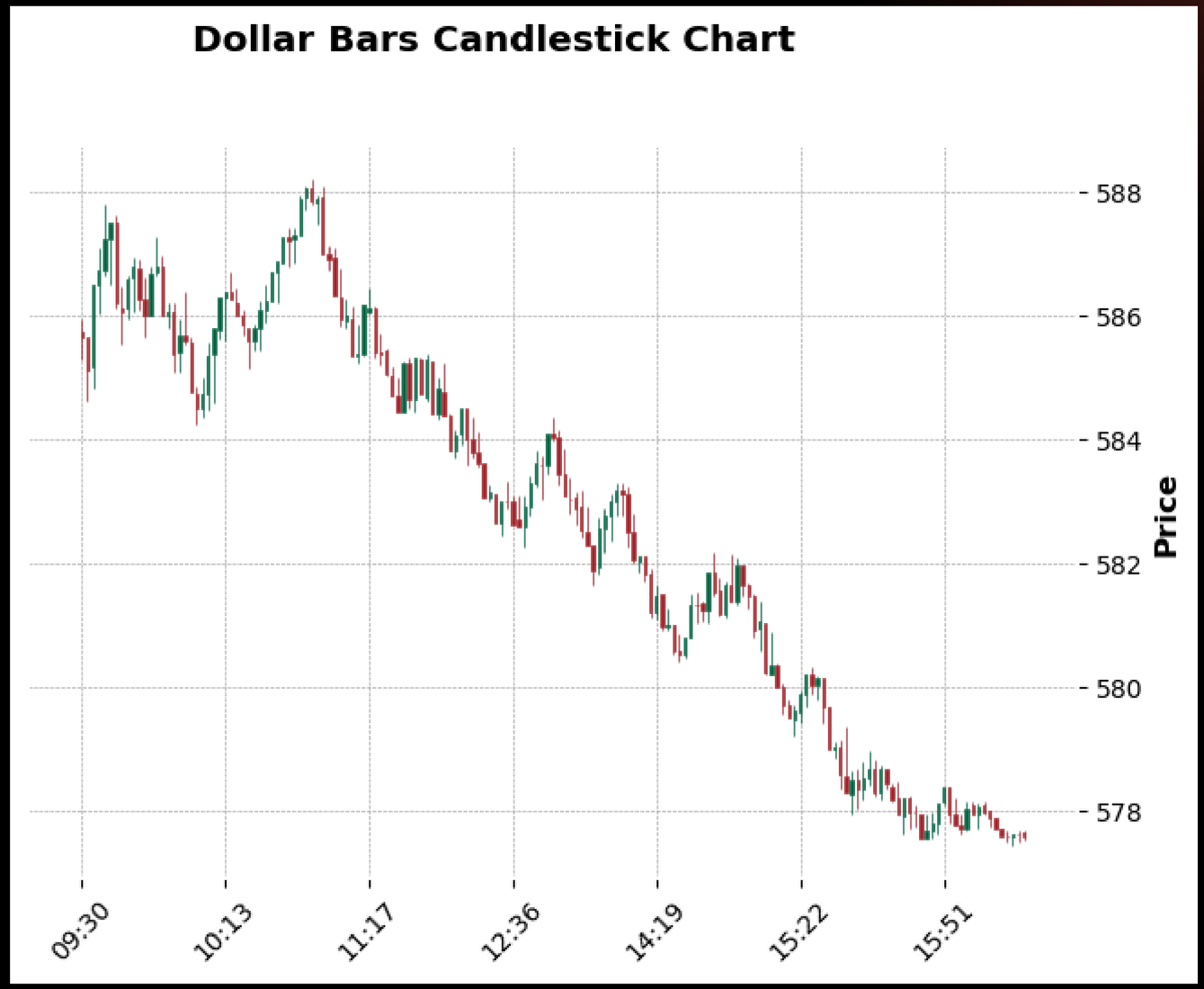


Dollar Bars

Sampling Market data after specific monetary value of the asset is traded (10,000,000 in the graph)

Rationale-

- Reflective of Market Activity
- Adjusts to changes in capitalisation of asset (even in cases of buybacks, divisions, etc.)
- Prevents over-sampling, under-sampling imbalance as each bar represents the same capital



Comparison of **Standard Bars**

Comparison

Stable average of only Dollar Bars as they rely on actual asset price.

Volume & Tick Bars explode in averages over time

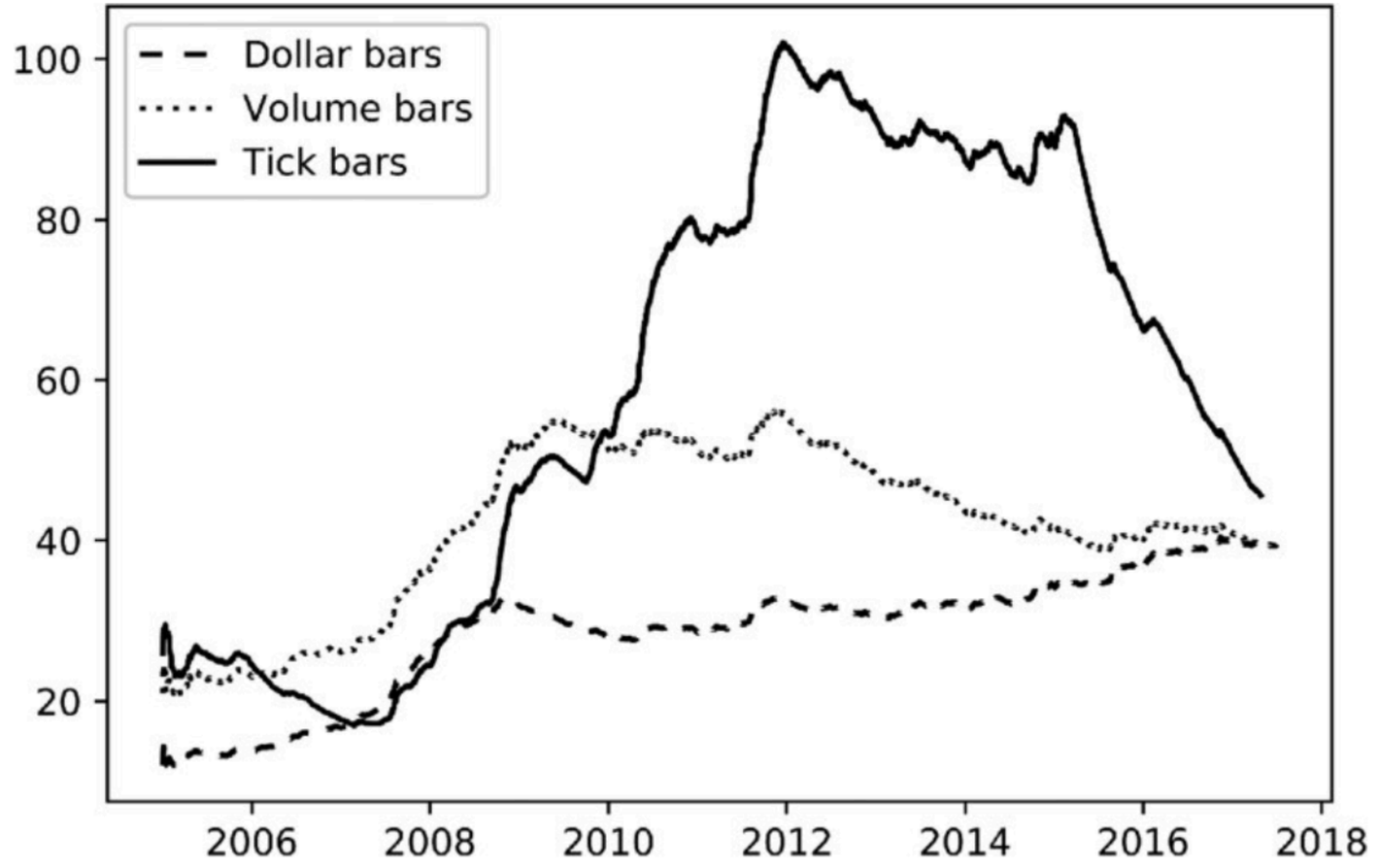
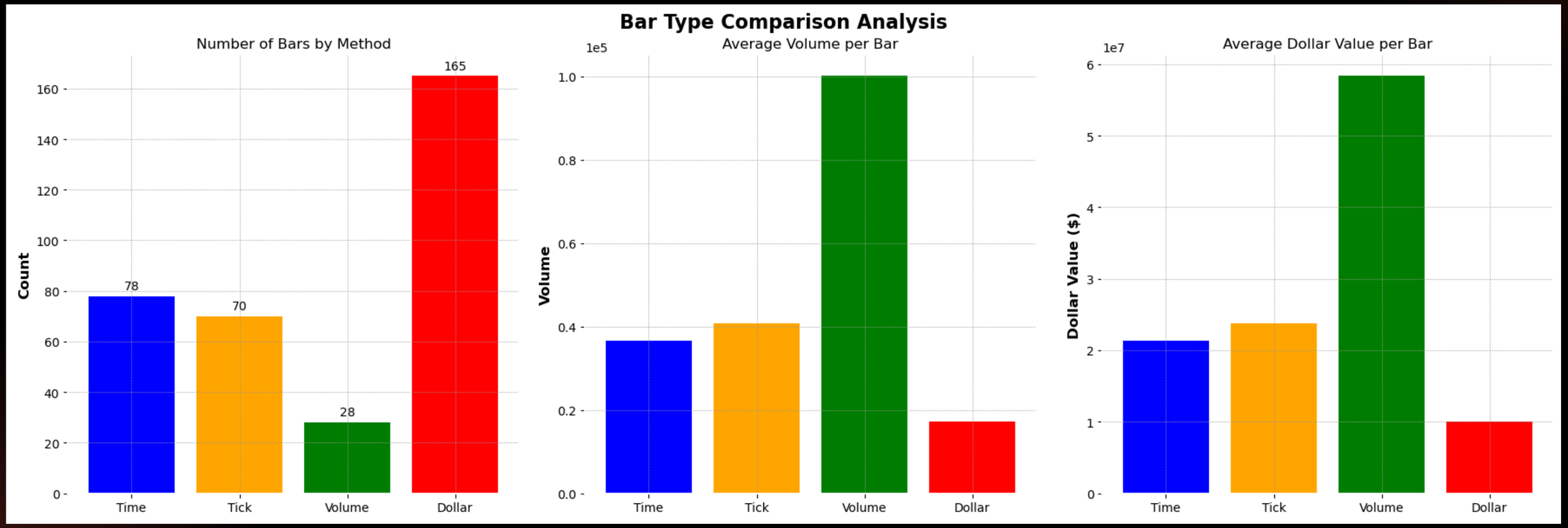
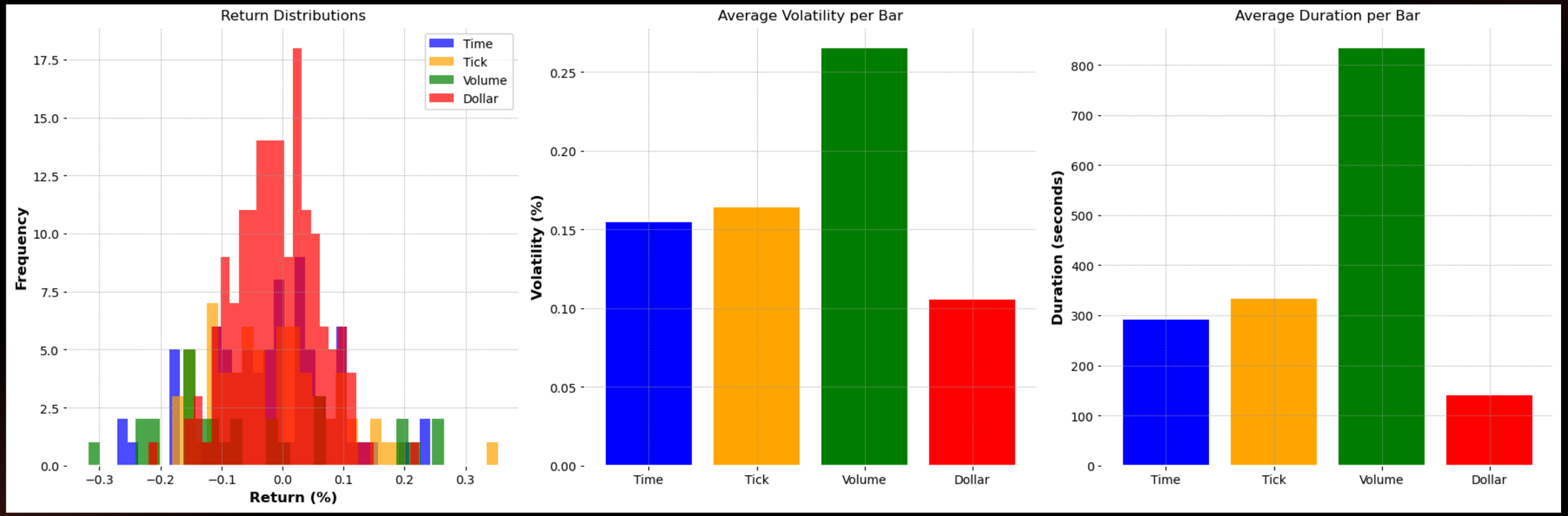


FIGURE 2.1 Average daily frequency of tick, volume, and dollar bars

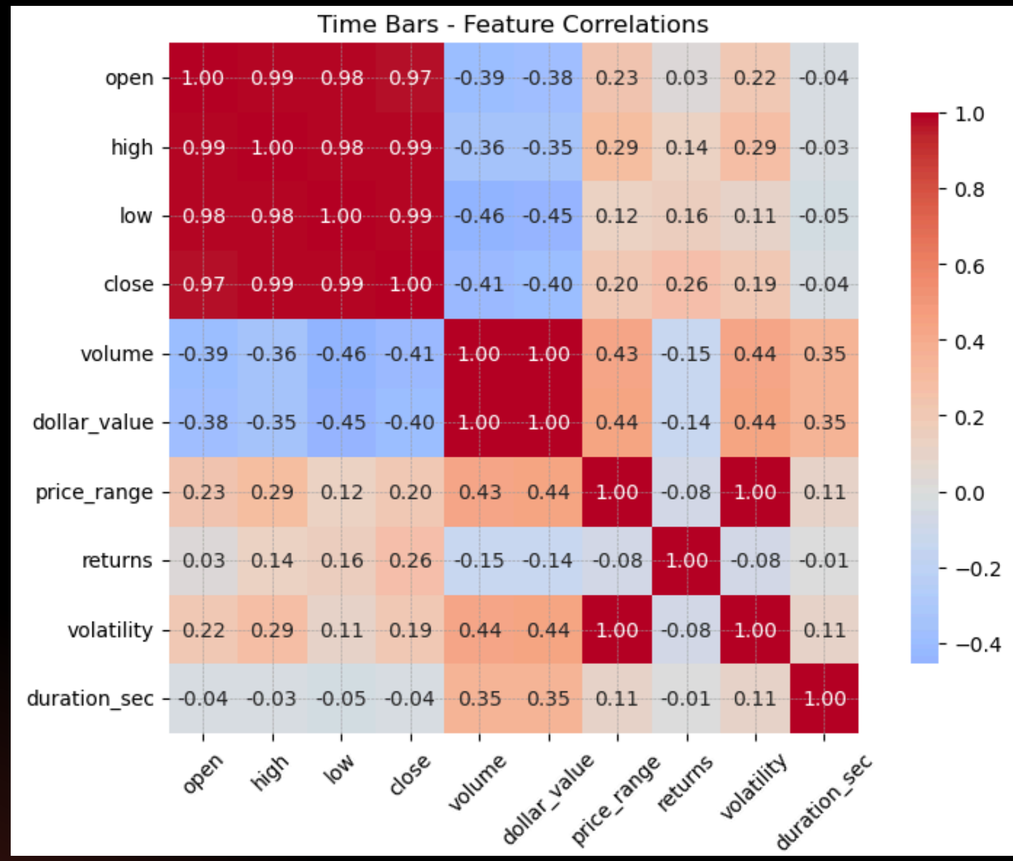
Bar Type Comparison Analysis

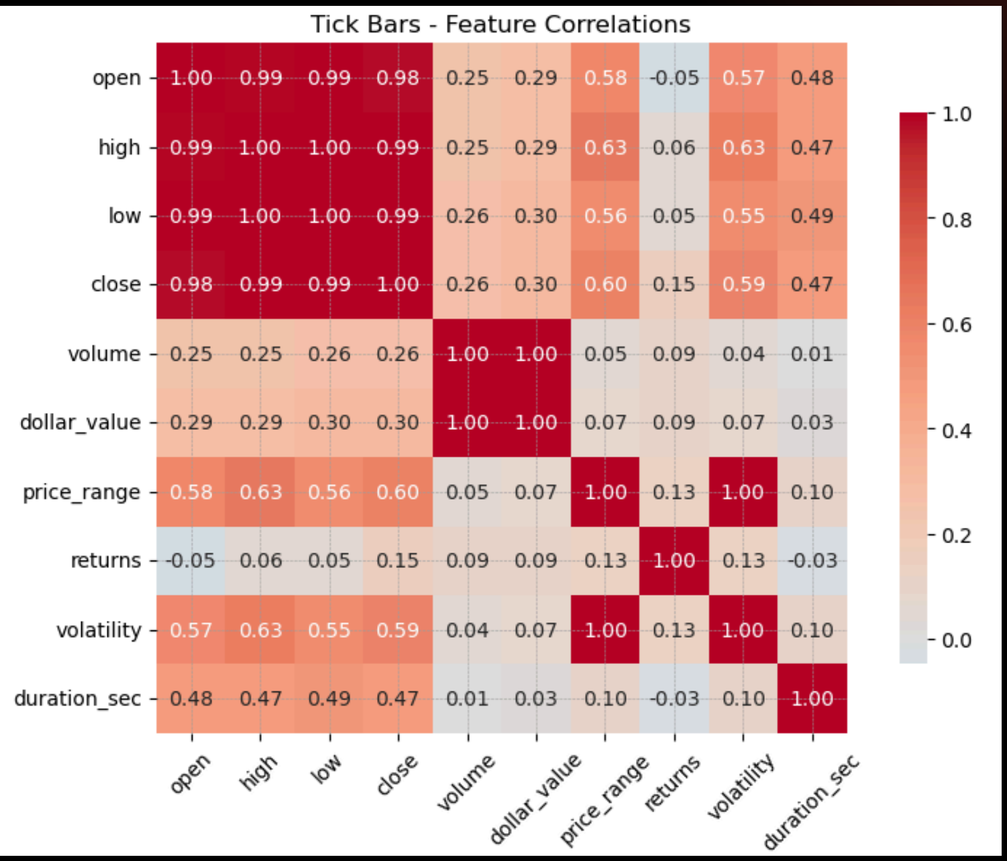


Bar Type Comparison Analysis



Feature Correlations





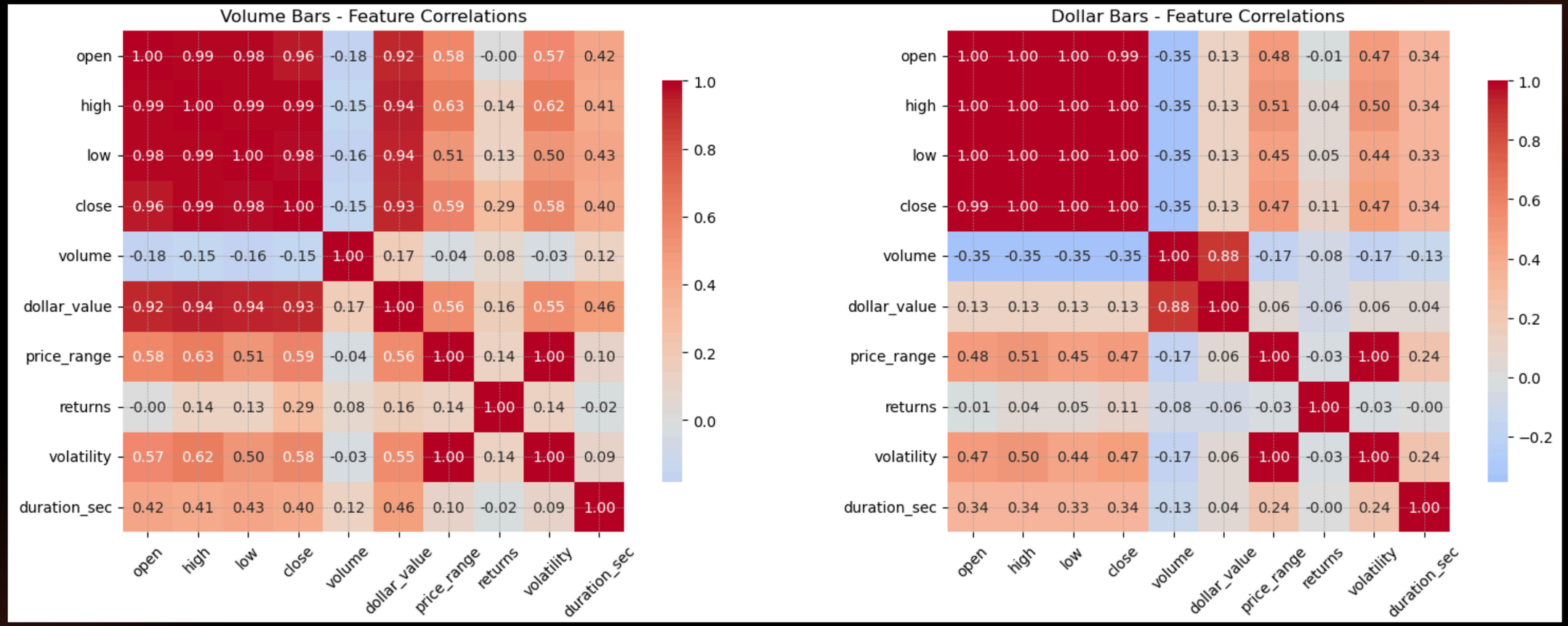
Volume negatively correlates with prices

When prices are high, volume tends to be lower

Price range correlates with volatility

Bigger price moves = more volatile

Feature Correlations



Strong **price-dollar** value correlation

Higher prices = higher dollar values

Negative **volume-price** correlation

When prices are high, fewer shares needed to reach dollar threshold

Time Series
Modelling


THANK
YOU.