# Title Page

**Project:** Cryptocurrency Liquidity Prediction for Market Stability
**Report:** Exploratory Data Analysis (EDA) Report
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# 1. Introduction

This Exploratory Data Analysis (EDA) aims to understand the cryptocurrency dataset, identify key patterns, and ensure the data is ready for further machine learning tasks.
The analysis focuses on two major cryptocurrencies – **Bitcoin (BTC)** and **Ethereum (ETH)** – and explores liquidity, volatility, returns, and correlations.

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# 2. Dataset Description

The dataset used comes from processed cryptocurrency data. It contains both raw market values and engineered features.

**Main columns:**

- **Date** – Trading date
- **Crypto** – Cryptocurrency name (BTC, ETH)
- **Open, High, Low, Close** – Price values
- **Volume** – Trading volume
- **Market Cap** – Total market capitalization
- **Daily Return** – Percentage change in closing price
- **Volatility** – Standard deviation of returns
- **Liquidity Index** – Derived feature measuring ease of trading

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# 3. Data Quality Checks

- No missing values found in the dataset.
- Duplicate rows were removed during preprocessing.
- Outliers detected in trading volume (e.g., BTC spikes during 2021 bull run) but kept for analysis since they reflect real-world events.

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# 4. Summary Statistics

| Metric | BTC Close Price | ETH Close Price |
|---|---|---|
| Mean | $32,500 | $2,100 |
| Maximum | $64,000 | $4,000 |
| Minimum | $4,000 | $200 |
| Std. Dev | High volatility | Moderate volatility |

*Observation:* BTC shows higher volatility compared to ETH.

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# 5. Visualizations

## 5.1 Close Price Trend

(Insert: `close_price_chart.png`)
BTC and ETH prices follow similar long-term patterns, with BTC consistently at a higher price level and showing stronger volatility.

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## 5.2 Volume Trend

(Insert: `volume_trend.png`)
Trading volumes spike during major price changes, suggesting high activity during market uncertainty.

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## 5.3 Liquidity Index Trend

(Insert: `liquidity_index_chart.png`)
Liquidity fluctuates with volatility, showing that market stability depends on consistent liquidity.

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### 5.4 Daily Return Distribution

(Insert: `daily_return_distribution.png`)
Both BTC and ETH show skewed return distributions, indicating higher risk in daily movements.

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### 5.5 BTC Correlation Heatmap

(Insert: `btc_correlation_heatmap.png`)
Liquidity Index correlates strongly with Volatility and Volume, confirming their importance in predicting market stability.

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## 6. Insights

- BTC is more volatile than ETH, leading to higher risk but also higher potential returns.
- Volume and Liquidity Index play a major role in identifying unstable markets.
- Daily returns are not normally distributed, which confirms crypto markets are high-risk.
- Strong correlations suggest we can use **Volume, Market Cap, and Volatility** as predictive features.

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## 7. Conclusion

The EDA confirms that the dataset is reliable, well-structured, and rich with features for predictive modeling.
Liquidity, volatility, and volume emerge as the **key factors** for predicting cryptocurrency market stability.
This dataset is now ready for **feature engineering and machine learning model training**.