# Fin: Tools for Research, Trading, and Market Analysis

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## Overview

This repository consolidates a wide range of my technical work in financial analysis, algorithmic and quantitative trading, econometrics, and market research. Recently, I have started updating and organizing legacy projects, refactoring and documenting each tool for clarity and reproducibility. Expect regular improvements as I continue to find and post additional projects.

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## Project Structure

**Financial analysis tools:** Contains technical indicators and a DCF calculator for equity research. Please refer to the individual subrepo README for complete details.

**basket implied correlation:** Jupyter notebooks and documentation for basket, matrix, and implied correlation analysis in equities and options. Serves as the foundation for a dispersion database.

**fin econometrics:** Includes DCC-GARCH models for multivariate volatility estimation in R; primary stage completed.

**miscipo allotment chances:** Basic IPO allotment probability calculator using empirical or simulated approaches. Minimal focus; see code for details.

**ml:** Machine learning pipelines for stock filtering and factor modeling. Project in progress (not fully complete).

**pair trading bajaj:** Fully documented pair trading and cointegration research for Bajaj Finance and Bajaj Finserv with tested backtesting reports.

**volatility-skew-analysis:** Advanced SPX volatility surface modeling and systematic skew trading analysis. Includes signal calibration, validation code, and thorough documentation.

## Getting Started

Clone the repository and install core dependencies:

```
git clone https://github.com/raghav285/Fin.git
cd Fin
pip install -r requirements.txt
```

For R/Jupyter projects, refer to specific folder instructions.

## Key Results and Visuals

Results and figures are documented in subrepos and will be updated as individual scripts are refactored. Major results include out-of-sample performance metrics, volatility calibration outcomes, and pair trading Sharpe ratios.

## Tech Stack

- Python (numpy, pandas, scikit-learn, matplotlib, statsmodels, etc.)
- Jupyter Notebooks
- R (for econometrics and volatility modeling)

Please see requirements files in each folder for details.

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## Contact

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