# Project Report – Factor Investing Backtesting

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## Overview

Today's session focused on building and backtesting factor investing strategies using the European investment universe of 135 tickers derived from Yahoo Finance. We developed data pipelines, ran momentum and value anomaly backtests, and interpreted performance results.

## 1. Data Preparation

• Created a unified European equity dataset with 135 validated tickers from multiple exchanges.  
• Downloaded and cleaned price data from Yahoo Finance using yfinance, storing outputs in the Investment\_universe folder:  
 - europe\_prices.csv (adjusted close prices)  
 - europe\_returns.csv (daily returns)  
 - universe\_final\_mapping.csv (final validated ticker mapping)  
• Ensured long data coverage (2013–2025) for Fama–French-style factor modeling.

## 2. Momentum (MOM) Factor Backtest

• Implemented a 12–1 cross-sectional momentum strategy (past 12 months excluding the most recent month).  
• Monthly rebalancing: top 20% of stocks (long), bottom 20% (short).  
• Equal-weighted, with transaction costs and turnover tracking.  
• Output files:  
 - mom\_portfolio\_monthly\_returns.csv  
 - mom\_turnover.csv  
 - mom\_performance\_summary.csv

The momentum backtest established the foundation for building dynamic, risk-adjusted portfolios and will later be compared against the value factor for multi-factor modeling.

## 3. Value (HML) Factor Backtest

• Implemented a Fama–French-style Book-to-Market (B/M) sorting strategy.  
• Annual rebalancing every June, holding portfolios for 12 months.  
• Used fallback Book Value per Share (BVPS/Price) where full fundamentals were missing.  
• Produced value\_portfolio\_monthly\_returns.csv and summary statistics.

Initial run had no data due to missing fundamentals; after adding the BVPS fallback, the strategy successfully ran with realistic statistics:  
 - CAGR ≈ 6.8%  
 - Ann. Volatility ≈ 20.9%  
 - Sharpe Ratio ≈ 0.33  
 - Max Drawdown ≈ -49%  
 - Average Monthly Turnover ≈ 34%

## 4. Diagnostic Analysis

• Reviewed strategy outputs for realism and statistical stability.  
• Added performance interpretation and risk diagnostics (volatility, Sharpe, drawdowns).  
• Built a tear sheet template for comparing Value vs. Momentum vs. Equal-weight benchmarks.

## 5. Next Steps

• Incorporate volatility targeting and rank-smoothing to reduce turnover and drawdowns.  
• Extend analysis to a multi-factor model blending Momentum and Value.  
• Add Quality and Size factors for a full 4-factor (or 5-factor) framework.  
• Integrate backtested results into a portfolio optimizer and visualization dashboard.

Report generated automatically based on today's modeling workflow.