Final Exam

Factor investing has become increasingly popular for institutions and retail investors. Research has shown that certain factors have historically earned a long-term risk premium. In this class we covered several popular factors such as size (SMB), value (HML), momentum (MOM), and low volatility. Factor investing refers to the investment process that aims to capture these risk premia through exposure to these factors. This test focuses on the size, value, and cross-sectional momentum factors.

1. (15 points) Briefly explain why long-term risk premia may exist for the size, value and momentum factors. For each factor, provide at least one risk-based and one behavioral/constraint-based explanations.

2. (20 points) Use the monthly return data provided in the excel file, compute the monthly returns for market in excess of risk-free rate, SMB, HML, and MOM. Answer the following questions based on these monthly returns.
   (1) Why can factor investing improve the efficiency of traditional long-only portfolios? Explain and present analytical evidence.
   (2) Compute the average calendar-month returns for each factor (e.g. average SMB return in January across all years, average SMB return in February across all years, …, average SMB return in December across all years). What calendar-month patterns do you observe? Do you think these patterns are simply data snooping or systematic? Explain and present analytical evidence.

3. (25 points) Use the monthly return data and compute the cumulative return series for the market portfolio, SMB, HML, and MOM.
   (1) Plot the cumulative return series for all three factors (SMB, HML, and MOM).
   (2) Based on (1), do you think these factor returns exhibit strong cyclicality (sometimes losing money for extensive periods and sometimes earning positive returns for extensive periods)? Do you think such cyclicality exhibits strong correlation among factors (i.e. tend to losing and winning at the same time)? What are the implications for investors?
   (3) Based on your analysis in (2), propose your own factor investing strategy (based on the factors provided) to improve the overall efficiency. Compute and compare the following statistics for the market portfolio, SMB, HML, MOM, and your own strategy: average annualized return, annualized standard deviation, Sharpe ratio, 5% VaR, skewness and kurtosis measures. Plot the cumulative return series for your own factor investing strategy. Discuss how your own strategy fares against the other portfolios.