Y-FoRM | 09/05/2023

Factor Modeling

Trading Signal & Back Testing

Name of Project:
Python(2)

Presented By:
32기 박호찬

CONTENTS

00	Recap
01	Objectives and Goals
02	After CAPM
03	Factor Strategies
04	Evaluation

RECAP

VaR
Portfolio, CAPM
Bond
Derivatives
Regression, Markov Chain
RNP, SP
Python: Data Preprocessing, Visualization, Scrapping

Y-FoRM 2023-1 정규 세미나 커리큘럼(수정)

주차	날짜	대분류	소분류	주제	단위수(H)	발표자
1	3/14 (화)	봄학기 OT				
	3/17 (금)	리스크	일반	리스크 및 VaR	1.5	이수빈
		뒷풀이				
2	3/21 (화)	금융기초	수학	수학기초	1.5	최정환
		금융기초	통계	통계기초	1.5	
	3/24 (금)	프로그래밍	Python(1) : Numpy, Pandas, Web Crawling		3	파이썬학술부
3	3/28 (화)	금융기초	재무	포트폴리오 이론, CAPM	3	차정은
	3/31 (금)	금융기초	금융상품	채권	3	권주혁
4	4/4 (화)	금융공학	금융상품	파생상품	3	박나영, 김정은
7	4/7 (금),	금융 실무의 이해 (1)				
	4/28 (금)	금융 실무의 이해 (2)				
8	5/2 (화)	금융심화	통계	통계심화	3	김규호, 윤성진
	5/4 (목)	금융수학	Pricing	RNP, SP	3	서수민
9	5/9 (화)	프로그래밍	Python(2) : 매매 시그널 Back testing		3	파이썬학술부
	5/12 (금)	금융수학	Pricing	BSM	3	이승영
10	5/16 (화)	금융심화	Hedging	옵션심화 및 Greeks	3	이채연, 양동호

OBJECTIVES AND GOALS

Clarify the project's main overall objectives and goals.

Goal # 1

CAPM - Fama French 3 Factor

Goal # 2

Factor Strategies
& Backtesting

Goal # 3

Evaluation

AFTER CAPM

1st Quarter
CAPM

2nd Quarter
APT

3rd Quarter
Fama French 3 Factor

4th Quarter
Factor Portfolio

AFTER CAPM

1st Quarter
CAPM

2nd Quarter
APT

3rd Quarter
Fama French 3 Factor

4th Quarter
Factor Portfolio

$$R_i = R_f + \beta_i * (R_m - R_f)$$

AFTER CAPM

1st Quarter
CAPM

2nd Quarter
APT

3rd Quarter
Fama French 3 Factor

4th Quarter
Factor Portfolio

$$E[R_i] = \alpha_i + \beta_{i,1}F_1 + \beta_{i,2}F_2 + \ldots + \beta_{i,j}F_j$$

AFTER CAPM

1st Quarter
CAPM

2nd Quarter
APT

3rd Quarter
Fama French 3 Factor

4th Quarter
Factor Portfolio

$$R_E = r_f + \beta_{MKT}(r_m - r_f) + \beta_{SMB}E_{SMB} + \beta_{HML}E_{HML}$$

- $\beta_{MKT,SMB,HML}$: 주식, 소형주, 가치주의 체계적 위험과 그 민감도의 보상
- R_E : 주식 평균 수익률
- r_f : 무위험 수익률
- r_m : 시장 평균 수익률
- E_{SMB} : 소형주의 대형주에 대한 시장의 평균적인 위험프리미엄(소형주)
- E_{HML} : 높은 BE/ME의 낮은 BE/ME에 대한 위험프리미엄(가치주)

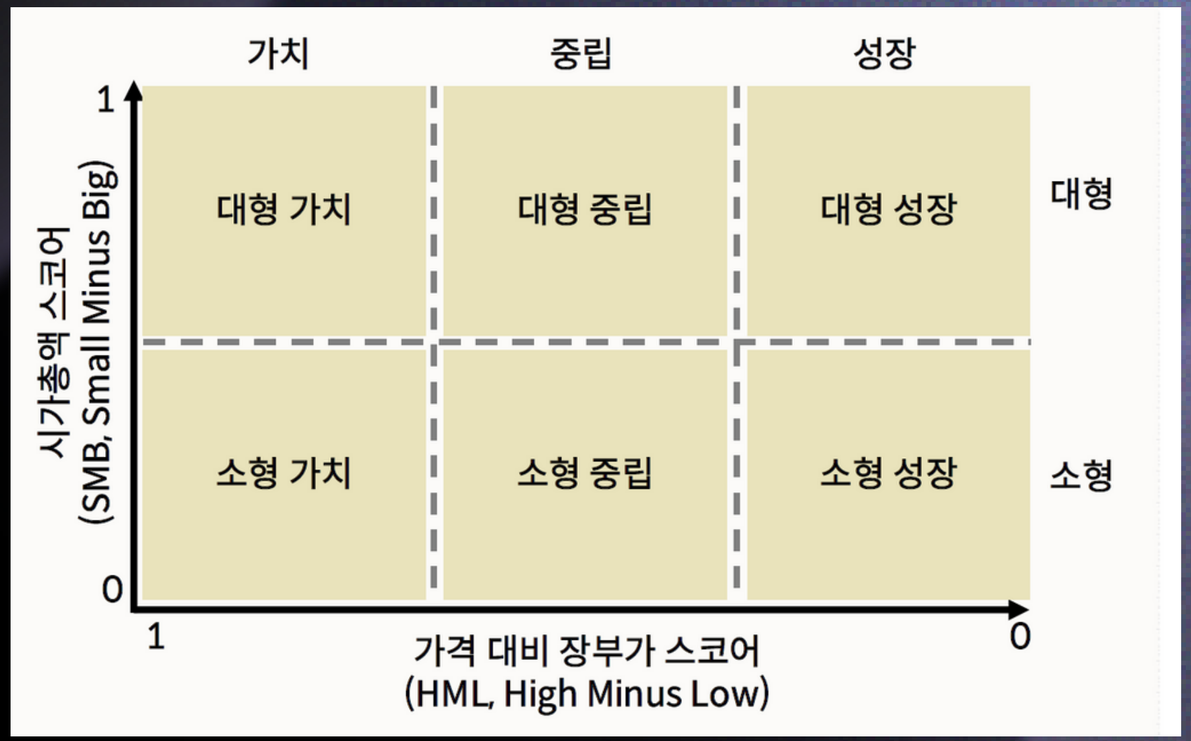
AFTER CAPM

1st Quarter
CAPM

2nd Quarter
APT

3rd Quarter
Fama French 3 Factor

4th Quarter
Factor Portfolio



AFTER CAPM

1st Quarter
CAPM

2nd Quarter
APT

3rd Quarter
Fama French 3 Factor

4th Quarter
Factor Portfolio

- SMB = $\frac{1}{3}$(Small Value + Small Neutral + Small Growth) - $\frac{1}{3}$(Big Value + Big Neutral + Big Growth)
- HML = $\frac{1}{2}$(Small Value + Big Value) - $\frac{1}{2}$(Small Growth + Big Growth)

AFTER CAPM

1st Quarter
CAPM

2nd Quarter
APT

3rd Quarter
Fama French 3 Factor

4th Quarter
Factor Portfolio

$$E(r_i) = r_f + \beta_i^M \left[E(r_M) - r_f\right] + \beta_i^{SMB} E(r_{SMB}) + \beta_i^{HML} E(r_{HML}) + \beta_i^{MOM} E(r_{MOM})$$

개념	레이블	이름	리스크 팩터 계산
기업 규모	SMB	Small Minus Big	9개의 작은 주식 PF – 9개의 큰 주식 PF
가치	HML	High Minus Low	2개의 가치 PF – 2개의 성장(낮은 BE/ME) PF
수익성	RMW	Robust Minus Weak	2개의 강건한 OP PF – 2개의 약한 OP PF
투자	CMA	Conservative Minus Aggressive	2개의 보수적인 투자 포트폴리오 – 2개의 공격적인 투자 포트포리오
시장	Rm-Rf	Excess return on the market	미국 거래소에 상장돼 있는 모든 기업의 가치 가중 수익률 – 1개월 재무부 국채 수익률

AFTER CAPM

1st Quarter
CAPM

2nd Quarter
APT

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4th Quarter
Factor Portfolio

Model	Regression equation
Capital Asset Pricing Model	$R_{it} - R_{Ft} = a_i + b_i(R_{Mt} - R_{Ft}) + e_{it}$
Fama – French Three-Factor Model	$R_{it} - R_{Ft} = a_i + b_i(R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + e_{it}$
Fama – French Five-Factor Model	$R_{it} - R_{Ft} = a_i + b_i(R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + e_{it}$
Fama – French Four-Factor (combine $\mathbf{R_M} - \mathbf{R_F}$, SMB, and pairs of HML, RMW, and CMA)	(1) $R_{it} - R_{Ft} = a_i + b_i(R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + r_i RMW_t + e_{it}$ (2) $R_{it} - R_{Ft} = a_i + b_i(R_{Mt} - R_{Ft}) + s_i SMB_t + h_i HML_t + c_i CMA_t + e_{it}$ (3) $R_{it} - R_{Ft} = a_i + b_i(R_{Mt} - R_{Ft}) + s_i SMB_t + r_i RMW_t + c_i CMA_t + e_{it}$

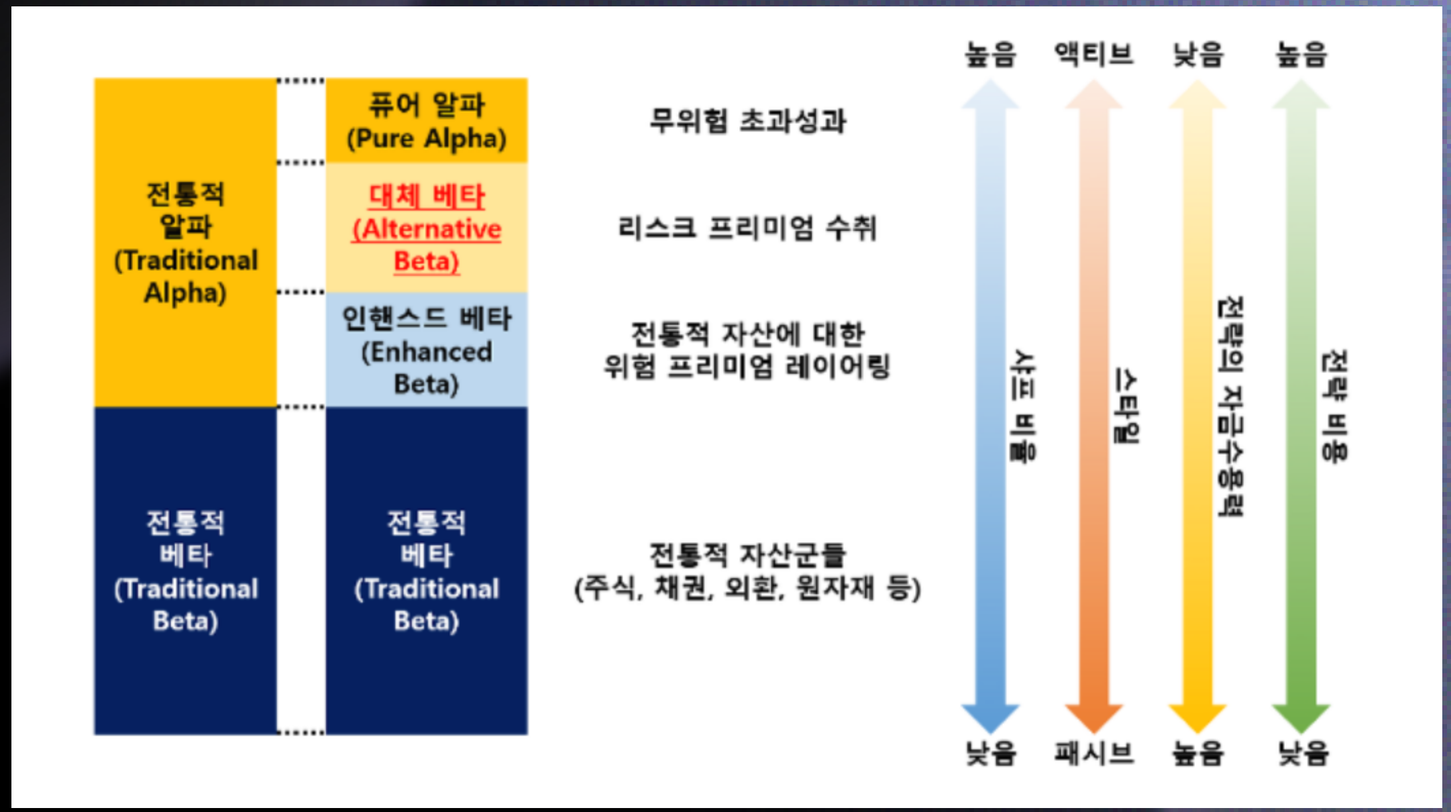
AFTER CAPM

1st Quarter
CAPM

2nd Quarter
APT

3rd Quarter
Fama French 3 Factor

4th Quarter
Factor Portfolio



AFTER CAPM

1st Quarter
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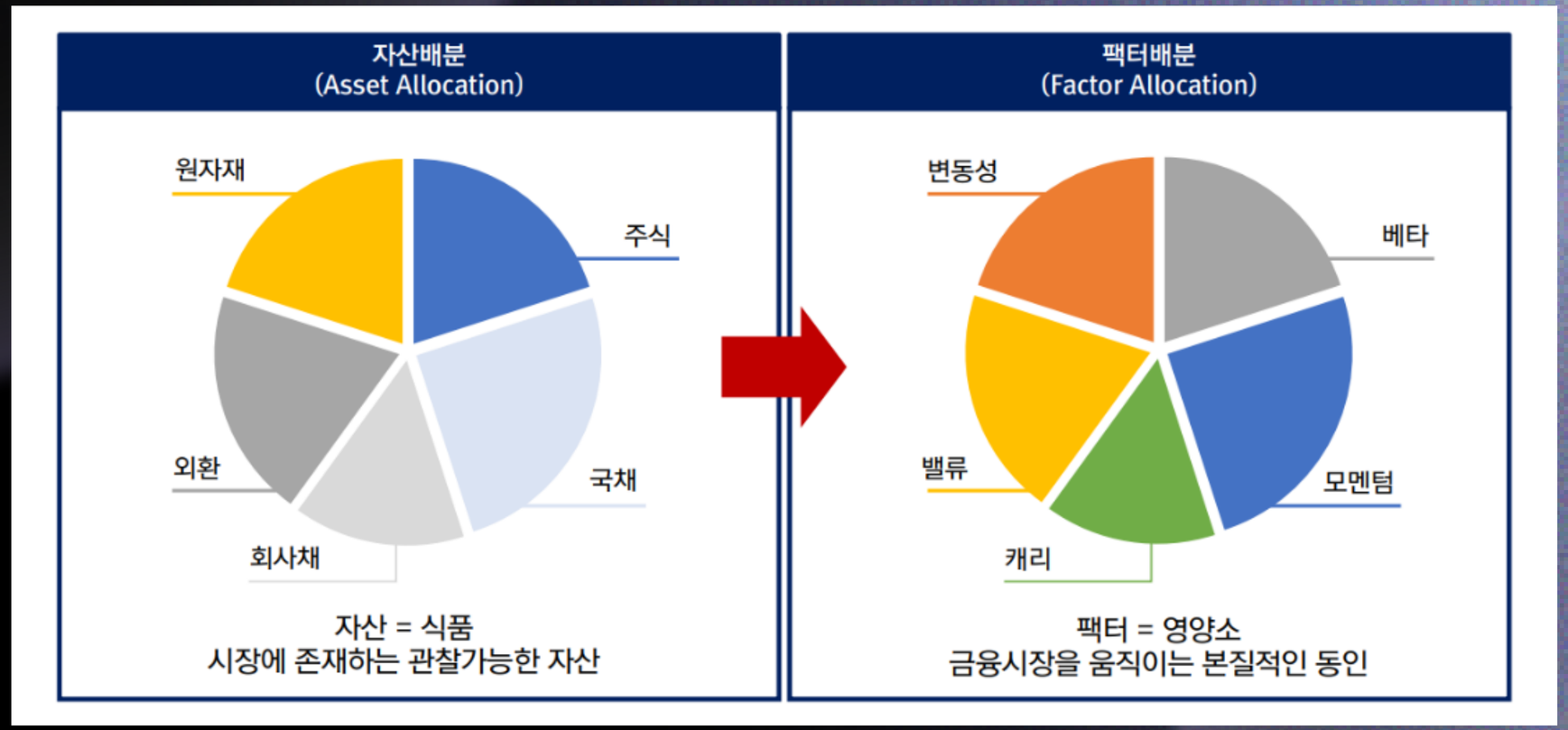
4th Quarter
Factor Portfolio



Factor Strategies

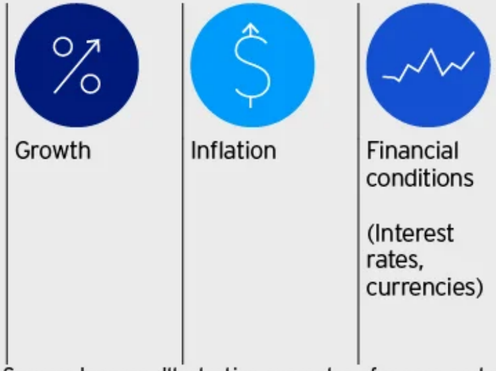
Examples of Factors

Figure 1

Examples of style and macro factors

Style factors: Investment factors that can be expressed in investment strategies

Macro factors: Broad and systematic factors that impact asset prices but may not be expressible directly using securities



Source: Invesco. Illustrative examples of macro and style factors.

Factor Strategies

Factors with Assets

크로스에셋 \ 멀티팩터	Beta	Carry	Momentum	Value	Volatility	⋯
Equity	Beta Equity	Carry Equity	Momentum Equity	Value Equity	Volatility Equity	⋯
Bond	Beta Bond	Carry Bond	Momentum Bond	Value Bond	Volatility Bond	⋯
Currency	Beta Currency	Carry Currency	Momentum Currency	Value Currency	Volatility Currency	⋯
Commodity	Beta Commodity	Carry Commodity	Momentum Commodity	Value Commodity	Volatility Commodity	⋯
⋮	⋮	⋮	⋮	⋮	⋮	

Factor Strategies

Momentum Factor Strategy

Momentum strategies exploit a tendency for a stock's prior returns and prior news about its earnings to predict future returns. The authors confirm momentum for subsequent six-month and one-year periods. Prior returns and prior earnings contribute to predicted future returns after controlling for the other.

Factor Strategies

Momentum Factor Strategy

Absolute Momentum

N period Return : (+/-)

Relative Momentum

Top N Assets : Long
Bottom N Assets : Short

Dual Momentum

Abs. Momentum * Rel. Momentum

Factor Strategies

Value Factor Strategy

Fundamental

Intrinsic Value
(PBR, PSR, PER)

Market Value

Disparity
Seasonality

Relative Value

Pair Trading
Arbitrage

Factor Strategies

Carry Factor Strategy

What Is a Carry Trade?

A carry trade is a trading strategy that involves borrowing at a low-interest rate and investing in an asset that provides a higher rate of return. A carry trade is typically based on borrowing in a low-interest rate currency and converting the borrowed amount into another currency. Generally, the proceeds would be deposited in the second currency if it offers a higher interest rate. The proceeds also could be deployed into assets such as stocks, commodities, bonds, or real estate that are denominated in the second currency.

Factor Strategies

Carry Factor Strategy

Stock Carry

Dividend

Bond Carry

Term Spread
Term Structure

Derivative Carry

Term Structure
Contango & Backwardation

EVALUATION

INDICATORS

SHARPE RATIO

VaR_Return_Ratio

CVaR_Return_Ratio

EVALUATION

Evaluation for Factor Portfolio - Correlation between Factors

Questions