Contextual Fundamentals, Models, and Active Management

Eric H. Sorensen, Ronald Hua, and Edward Qian

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- Improving on one-size-fits-all.

Introduction

- Quantitative and fundamental money managers seek to find and construct portfolios of undervalued securities in the hope of delivering positive alpha in an efficient manner.
- Most understand that a given financial signal associated with specific stocks is often variably important.

Introduction

- Recall the **multi-factor model**:

$$R_{i,t} = a_i + b_{i1} f_{1,t} + b_{i2} f_{2,t} + ... + b_{ik} f_{k,t} + \epsilon_{i,t}$$

- An asset's returns can be predicted using the relationship between that asset and many common risk factors.
- What this paper did: A specific factor should influence the returns across stocks **differently**.
- Evidence that some factors work well (or poorly) depending on certain other characteristics of the stock. (Example: earnings momentum for companies in mature businesses with predicatable growth vs companies in high potential growth and high-risk businesses)

Introduction

- This paper presents quantitative methodologies that explicitly recognize that a quantitative factor like present value or the PE ratio is not "one size fits all."
- Starting with the investment objective function of maxmization of information ratio (IR), this paper offers a modeling process that is **more robust** in linking signals with investment returns.

Introduction

- The result which we are going to verify is that factor weights vary across risk-specific universe subgroups.
- Maximize information ratio (IR)
- $IR = \frac{E(Rp - Rb)}{\sigma}$ Rp: portfolio return Rb: benchmark return
- Information ratio vs Sharpe ratio
- The most frequently used benchmark is the S&P 500 index.
- It indicates how much the **actively managed portfolio** consistently outperforms **passive portfolio**.

Context

- In practice, linking a stock's ranking signal or factor to expected return and assigning it an appropriate weight is a matter of **context**.
- For example, Daniel and Titman [1999] find that momentum effects are stronger for growth stocks.
- It is important to analyze the efficacy of alpha factors within carefully selected security universes: **the contextual analysis of active strategies.**

Analytical Framework

- Hypothesis: there can be significantly different optimal factor weights when conditioned on different risk characteristics.
- The basic building block of our framework begins with the historical information coefficient (IC) of each factor.

IC (Information Coefficient)

- raw IC: the correlation between the raw factor forecasts and subsequent returns;
- risk-adjusted IC: strips out multiple systematic risk exposures and accomodates stock-specific risks.
- We estimate the risk-adjusted IC by stripping out exposures to the market beta and market capitalization, two risk factors with high cross-sectional explanatory power, which the traditional equity mandate typically prohibits in generating alpha.

IC

$$IC_{adj} = corr(f_{pure}, r_{residual})$$

$$f_{pure} = f - b_1 X - b_2 log(mktcap)$$

$$r_{residual} = r - m_1 X - m_2 log(mktcap)$$

Analytical Framework

-Sorenson(2004): the optimal weights are a function of average ICs and IC covariances:

$$w \propto V^{-1} * IC$$

- w is the vector of factor weights; V^{-1} is the inverse of the covariance matrix of IC - IC is the vector of the averages of the risk-adjusted ICs.

- We evaluate the interplay among different factor categories in an optimization framework. Our approach is to assess the relative importance of each category as it varies contextually across specific security contexts - partitions of a broad security universe along the dimensions of different risk characteristics.

Factor Categories

- A company's stock should achieve a market price that quantifies the present value of all potential future profitable operations of the firm that accrue to shareholders.
- Valuation = f(growth prospects, firm quality, investor expectations)
- In our study we focus on three sets of variables:

1. cheapness (often referred to as valuation, eg.B/P ratio)
2. corporate quality
3. investor sentiment

- Value investors/Fundamental investors/Momentum investors

Factor Categories

- Value investing: RV(Relative valuation); Fundamental investing: OE(Operating efficiency), AA(Accounting accurals); EF(External financing) Momentum: MO(Momentum);

EXHIBIT 1

Definition of Factor Composites

Composite	Factors
Valuation (RV)	book-to-price ratio sales-to-enterprise value eamings yield (historical) eamings yield (IBES FY1) EBIT-to-enterprise value
Operating Efficiency (OE)	increase in asset turnover ratio level of operating leverage cash flow from operation to sales
Accounting Accruals (AA)	accounting accruals (balance sheet) accounting accruals (cash flow statement)
External Financing (EF)	external financing-to-net operating assets debt issuance-to-net operating assets equity issuance-to-net operating assets share count increase
Momentum (MO)	six-month price momentum nine-month earnings revision eamings surprise score

Security Contexts

- We illustrate the interplay among three risk characteristics: value, growth, and earnings variability. Hence we create 6 differnet contexts.
- high/low value
- high/low growth
- high/low earnings varibility

Empirical Examination of Contextual Dynamics

- We use the Russell 1000 Index(An index of approximately 1,000 of the largest companies in the U.S. equity markets) as the security universe for the period January 1987-September 2004.

Empirical Examination of Contextual Dynamics

- Recall:

$$w \propto V^{-1} * IC$$

Exhibit 2

Comparison of Risk-Adjusted ICs in Different Risk Dimensions

Panel A: Value Dimension

	Mean		STD		Two Sample t Test		F Test			
	High	Low	High	Low	t	p value	F	pval	df(num)	df(denom)
RV	0.022	0.022	0.069	0.079	0.011	0.991	0.764	0.270	68	68
OE	0.032	0.040	0.047	0.037	-1.050	0.296	1.613	0.051	68	68
AA	0.027	0.042	0.043	0.050	-1.912	0.058	0.720	0.177	68	68
EF	0.044	0.015	0.041	0.057	3.460	0.001	0.504	0.005	68	68
MO	0.031	0.049	0.061	0.072	-1.577	0.117	0.711	0.163	68	68

Panel B: Growth Dimension

	Mean		STD		Two Sample t Test		F Test			
	High	Low	High	Low	t	p value	F	pval	df(num)	df(denom)
RV	0.003	0.034	0.113	0.062	-2.046	0.043	3.318	0.000	68	68
OE	0.061	0.019	0.043	0.042	5.702	0.000	1.037	0.883	68	68
AA	0.044	0.022	0.060	0.039	2.461	0.015	2.450	0.000	68	68
EF	0.028	0.017	0.054	0.043	1.274	0.205	1.567	0.066	68	68
MO	0.059	0.023	0.092	0.072	2.571	0.011	1.623	0.048	68	68

Panel C: Variability Dimension

	Mean		STD		Two Sample t Test		F Test			
	High	Low	High	Low	t	p value	F	pval	df(num)	df(denom)
RV	0.023	0.023	0.105	0.076	-0.025	0.980	1.911	0.008	68	68
OE	0.045	0.029	0.051	0.039	2.019	0.046	1.678	0.034	68	68
AA	0.033	0.032	0.049	0.036	0.151	0.880	1.848	0.012	68	68
EF	0.038	0.018	0.055	0.045	2.343	0.021	1.492	0.101	68	68
MO	0.034	0.038	0.094	0.074	-0.252	0.802	1.605	0.053	68	68

Optimal Factor Weights and Their Differences

EXHIBIT 4

Resampled Weight Comparison in Different Risk Dimensions

PANEL A: VALUE DIMENSION

	Mean		STD		Difference (High-Low)		
	High	Low	High	Low	Avg/Stdr	Avg	Stdr
RV	9.0	6.3	4.0	3.5	0.5	2.6	5.3
OE	16.7	46.4	6.0	8.9	-2.7	-29.7	10.8
AA	20.4	24.4	6.2	6.5	-0.4	-4.0	9.0
EF	43.0	5.1	7.9	4.8	4.1	37.9	9.3
MO	11.0	17.8	4.8	5.1	-1.0	-6.8	7.1

PANEL B: GROWTH DIMENSION

	Mean		STD		Difference (High-Low)		
	High	Low	High	Low	Avg/Stdr	Avg	Stdr
RV	3.7	22.8	2.4	7.3	-2.5	-19.1	7.6
OE	52.7	16.9	7.8	8.3	3.1	35.8	11.7
AA	16.7	33.3	5.0	8.8	-1.6	-16.6	10.1
EF	14.0	16.7	5.9	7.2	-0.3	-2.7	9.3
MO	12.9	10.3	4.0	5.0	0.4	2.6	6.3

PANEL C: VARIABILITY DIMENSION

	Mean		STD		Difference (High-Low)		
	High	Low	High	Low	Avg/Stdr	Avg	Stdr
RV	7.9	7.2	3.8	4.5	0.1	0.7	5.9
OE	36.1	27.0	7.4	6.5	0.9	9.1	10.0
AA	27.2	41.1	6.3	7.5	-1.4	-13.9	9.6
EF	22.5	10.5	6.6	5.1	1.4	12.0	8.4
MO	6.4	14.2	3.7	4.4	-1.4	-7.9	5.7

Pairwise Model Weight Comparison

EXHIBIT 5
Pairwise Model Weight Comparison

PANEL A: MODEL WEIGHTS OF RESAMPLED EFFICIENT PORTFOLIOS

		RV	OE	AA	EF	MO	
One-size	R1000	2.5	41.6	36.3	13.0	6.5	
Value	High	9.0	16.7	20.4	43.0	11.0	0
	Low	6.3	46.4	24.4	5.1	17.8	9
Growth	High	3.7	52.7	16.7	14.0	12.9	8
	Low	22.8	16.9	33.3	16.7	10.3	1
Variability	High	7.9	36.1	27.2	22.5	6.4	3
	Low	7.2	27.0	41.1	10.5	14.2	6

Contextual Alpha Model - A Promising Alternative Approach

- 4 variants of the contextual model: value, growth, variability, and comprehensive.

Performance Comparison

EXHIBIT 6

Performance Comparison of Optimal Dollar-Neutral Portfolios

PANEL A: MODEL PERFORMANCE

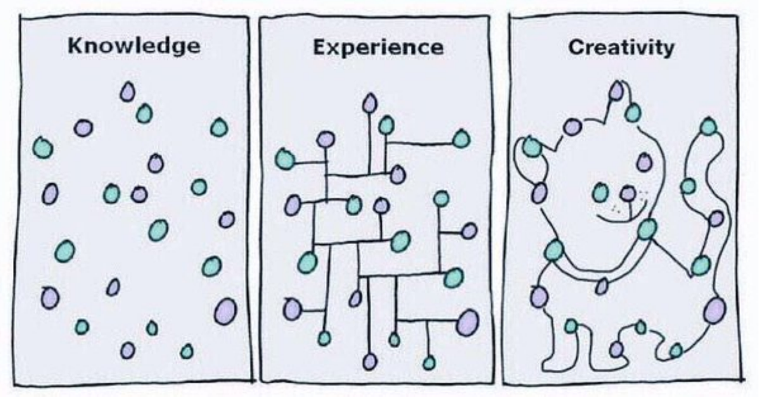
	Static	Value	Growth	Variable	Comp.
Alpha	7.41%	8.53%	8.54%	7.95%	8.57%
IR	1.56	1.63	1.66	1.54	1.72

Summary

- Rational asset pricing is **conditional**.
- To better capture cross-sectional pricing dynamics and improve the performance of active equity strategies, we propose an alternative approach to alpha modeling—contextual modeling.
- The approach represents a three-step process:
- **selecting contextual dimensions** that provide an adequate description of the conditional nature of how stocks are priced;
- **determining the optimal factor weightings** in each security context;
- **associating stocks with each security context** to obtain final scores.

My opinion

- This might be the simplest non-linear model and the least prone to data-mining. Economic interpretation is relatively easy.



My opinion

- To capture the risk characteristics, another way is to simply sort the stocks by industry (eg. finance, manufacture) and use it as the context to come up with the optimal factor weights.
- More evidence needs to be shown to prove this is more reasonable than sorting by industry (after all, similar source of income).