



Wharton
UNIVERSITY *of* PENNSYLVANIA

**JACOBS LEVY EQUITY
MANAGEMENT CENTER**
for Quantitative Financial Research

Discussion: Do Common Factors Really Explain the Cross-Section of Stock Returns?

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Main Message of Lopez-Lira and Roussanov

Table 6: Descriptive Statistics of the Portfolios: 1974–2014

Panel A: 1974–2014			
	Market	Long-short	Beta-neutral
Mean	0.52	0.72	0.74
Std. dev	4.65	3.34	1.70
Sharpe ratio	0.39	0.75	1.51

Panel B: 1974–1999			
	Market	Long-short	Beta-neutral
Mean	0.65	1.12	0.99
Std. dev	4.64	2.61	1.48
Sharpe ratio	0.48	1.49	2.32

Panel C: 2000–2014			
	Market	Long-short	Beta-neutral
Mean	0.28	-0.06	0.25
Std. dev	4.67	4.31	1.97
Sharpe ratio	0.21	-0.04	0.44

Does APT really work?

A tradable and profitable portfolio

that is orthogonal to APT factor risks.

- n **Thought-provoking**
- n **Academic:**
 - u Hopeless to expect a few factors to explain
 - F the large cross section of stock returns.
- n **Practice:**
 - u Hopeful more than ever to get alphas!

The Idea

- n Extract betas as usual from the covariance of asset returns
 - u allows slowing changing betas, though stationarity is needed.
- n Get the current beta from a beta evolution model
- n Forecasting returns with firm characteristics via **machine learning**
- n Use portfolio optimization to achieve various objectives
- n Unique features:
 - u clever idea: rich in finance intuition
 - u transparent

1: 0-cost Factor

$$\min_w \Pi = \frac{1}{2} w' \Omega w$$

$$s.t. \quad w' \mathbf{1}_N = 0$$

$$w' \beta_k = 1$$

$$w' \beta_j = 1, \quad j \neq k$$

2: 1-cost Factor

$$\min_w \Pi = \frac{1}{2} w' \Omega w$$

$$s.t. \quad w' \mathbf{1}_N = 1$$

$$w' \beta_k = 1$$

$$w' \beta_j = 1, \quad j \neq k$$

Question 1

n **Comparison:**

- u **While the recovered factors seem reasonable, it is of interest to see how well it compares with static factors from other studies**
 - F **PCA**
 - F **APCA, RP-PCA**
 - F **Geweke and Zhou (1996)** (Bayesian; citing is perhaps)
- u **The difference may help understand time-varying betas.**

3: 0-cost 0-Port

$$\min_w \Pi = \frac{1}{2} w' \Omega w$$

$$s.t. \quad w' \mathbf{1}_N = 0$$

$$w' \boldsymbol{\mu} = \mu_0$$

$$w' \boldsymbol{\beta}_j = 0, \quad \forall j$$

where $\boldsymbol{\mu}$ is the machine learning forecast.

4: 1-cost O-Port

$$\min_w \Pi = \frac{1}{2} w' \Omega w$$

$$s.t. \quad w' \mathbf{1}_N = \mathbf{1}$$

$$w' \mu = \mu_0$$

$$w' \beta_j = 0, \quad \forall j$$

where μ is the machine learning forecast.

Again

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Question 2

What happens with alternative μ ?

Sample mean, alternative ML estimates, etc

Shed lights on the role of information set and estimation efficiency

Why Momentum Matter?

$$Portfolio_t = \alpha + \sum_{i=1}^5 \beta_i F_{i,t} + \epsilon_t$$

	Long-Short	Beta-Neutral	Long-Short	Beta-Neutral
Intercept	0.75*** (4.41)	0.76*** (8.85)	0.53*** (2.95)	0.69*** (8.44)
Mkt-RF	-0.06 (-1.20)	-0.05** (-2.35)	-0.04 (-0.94)	-0.04 (-1.54)
SMB			0.10 (1.23)	-0.00 (-0.04)
HML			0.01 (0.14)	-0.02 (-0.36)
RMW			-0.19 (-1.36)	-0.15* (-1.95)
CMA			-0.00 (-0.00)	0.07 (0.99)
Mom			0.40*** (5.10)	0.15*** (5.18)

An Explanation

n **IID APT Factors:**

- u **As momentum has serial correction,**
 - F **APT factors unlikely to explain MOM**
- u **So factors orthogonal to APT may have relation MOM**
- u **The difference may help understand time-varying betas**

n **Fama-French Factors:**

- u **Largely uncorrelated**
- u **APT factors capture them**
- u **That is why O-Port is unrelated to them**

Question 3: get rid of MOM possible?

$$\min_w \Pi = \frac{1}{2} w' \Omega w$$

$$s.t. \quad w' \mathbf{1}_N = 1$$

$$w' \mu = \mu_0$$

$$w' \beta_j = 0, \quad \forall j$$

$$w' \beta_{MOM} = 0$$

Question 4: Iterated O-Port ?

$$\min_w \Pi = \frac{1}{2} w' \Omega w$$

$$s.t. \quad w' \mathbf{1}_N = 1$$

$$w' \mu = \mu_0$$

$$w' \beta_j = 0, \quad \forall j$$

$$w' \beta_{M-Port} = 0$$

Maximum Sharp Ratio?

$$\textit{Sharpe}^2 = \textit{Sharpe}_1^2 + \dots + \textit{Sharpe}_q^2$$

The Summary

- n **Thought-provoking**
- n **Intriguing Results**
- n **Consistent with**
 - u Adaptive Market Hypothesis of **Andrew Lo**
 - F Some risk factors may no longer risky once hedging figured out
 - u New Risk Factors may arise: e.g., COVID
- n **Factor investing research stays !**