Factors: At Capacity?

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What is the *long-term* capacity of factor strategies?

**Partial Equilibrium**
- What am I doing?
- Can I trade?
- What others are doing?
  - Current factor investors

**Stochastic Discount Factor**
- What everybody is doing
- Relation between capital invested and risk premiums
What is the long-term capacity of factor strategies?

Partial Equilibrium
- What am I doing?
- Can I trade?

Stochastic Discount Factor
- What everybody is doing
- Relation between capital invested and risk premiums

What are others doing?
Current factor investors
What are others doing?
The majority of assets are actively managed

Active equities still dwarfs passive, with smart beta a small fraction

S&P 500: $21.2T Trillion
US Active Equity Mutual Funds, $6.1T
US Passive Equity: $4.8T
US Smart Beta ETFs: $309 B
Min Vol ETFs: $41 B

Source: BlackRock, Morningstar, as of 8/31/2017
Most active U.S. mutual funds are short low volatility strategies

Aggregated Factor Exposures for All Active Mutual Funds
As of 3/31/2016 (source: Barra, BlackRock, Morningstar, MSCI, Thomson Reuters)

Crowding, Capacity, and Valuation of Minimum Volatility Strategies, Andrew Ang, Ananth Madhavan and Aleksander Sobczyk, August 2016
What is the capacity of factor strategies?

Partial Equilibrium

- What am I doing?
- Can I trade?
- What others are doing?
- Current factor investors

Stochastic Discount Factor

- What everybody is doing
- Relation between capital invested and risk premiums
Not enough value investors?

Weights of Value (top 30%) and Growth (bottom 30%) ranking by book-to-market

Data from Fama French [http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html](http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html) As of 07/31/2017

52% Growth

14% Value
CAPM Mispricing

\[ E(R) - R_f = \alpha + \beta \cdot \lambda_{mkt} \]

Using the market portfolio (mkt) as the stochastic discount factor

Value firms have positive alpha
Capital invested is “too low”
Returns are “too high”

Growth firms have negative alpha
Capital invested is “too high”
Returns are “too low”
There is an optimal stochastic discount factor, $m^*$ – represented by the efficient or tangency portfolio – where all alphas are equal to zero.

How far away is the market portfolio, $mkt$, from $m^*$?
Math

For a stochastic discount factor (SDF) \( m \), we have

\[
E(R) - R_f = \alpha + \beta \cdot \lambda_m
\]

The market is a special SDF with \( m = a + b \cdot R_{mkt} \), for \( a \) and \( b \) constants

Under the optimal SDF \( m^* \), which corresponds to the efficient or tangency portfolio, there are no alphas and thus no factor risk premiums

\[
E(R) - R_f = \beta \cdot \lambda_{m^*}
\]

We examine how far market portfolio weights are to the weights of the test assets in the optimal SDF
Large capital flows, higher prices, lower expected returns

When capital flows in, prices rise and expected returns decrease

When capital flows out, prices fall and expected returns increase

If we move capital from growth (with low returns) to value (with high returns) what is the decrease in the value – growth premium?
The market is inefficient

How could we move from the market to the efficient portfolio?

Efficient portfolio produces no value premium

Sell growth, buy value

Data from July 1963 to July 2017 Source: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html
Moving from growth to value

Improved portfolio efficiency from being short growth and long value

Data from July 1963 to July 2017  Source: Fama French Factors  http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html
Completion Portfolios

Consider the weights of the assets in the efficient SDF, $w^*$

$$w^* = w_{mkt} + (w^* - w_{mkt}),$$

In other words: the efficient weights are equal to market cap weights plus the completion portfolio

<table>
<thead>
<tr>
<th>Hypothetical Weights</th>
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<tr>
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<tr>
<td>Market Portfolio</td>
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<tr>
<td>Efficient Portfolio</td>
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<tr>
<td>Completion Portfolio</td>
</tr>
<tr>
<td>Growth</td>
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Short growth

Long value
Why is the efficient portfolio so far from the market portfolio?

As of August 2017, the US market is appx $26 trillion

- Moving to the efficient portfolio (where there is no value premium) requires a transfer of $41 trillion from growth to value stocks

**Rewarded Risk**

- Earn more for taking on higher risk

**Structural Impediment**

- Market rules or restrictions make some investments off-limits to certain investors

**Behavioral Bias**

- Not all investors behave rationally all of the time

Source: Standard & Poors as of August 31, 2017
Partial completion portfolios

Consider a pricing kernel where we move all capital of the lowest 30% stocks ranked by book-to-market (growth stocks) to the top 30% of stocks (value)?

- This will attenuate, but not remove the value premium

Value premium = 3.8%

The value premium decreases by approximately half

Value premium = 1.9%

Data from July 1963 to July 2017  Source: [http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html](http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html)
Size and Momentum Premiums

Size premium = 1.7%

Value premium = -1%

Momentum premium = 7.4%

Momentum premium = 5.9%

Data from July 1963 to July 2017  Source: [http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html](http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html)
Profitability and Low Volatility Premiums

Profitability premium = 3.3%

Profitability premium = 3.0%

Low vol premium = 6.1%

Low vol premium = 5.4%

Data from July 1963 to July 2017  Source: [http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html](http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html)
There is ample style factor capacity
What is the *long-term* capacity of factor strategies?

What is the *short-term* capacity of factor strategies?

Can we profitability time factor strategies?
Bibliography


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