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Factor Investing is Simple, but NOT Easy

We Empower Investors Through Education | Affordable Alpha

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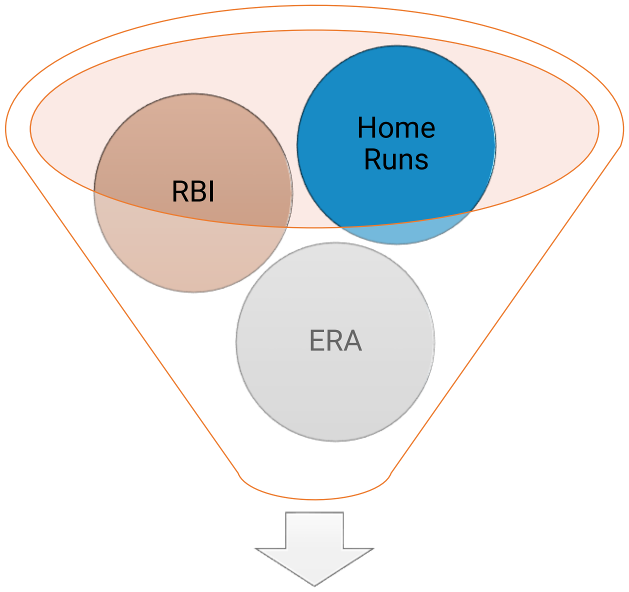
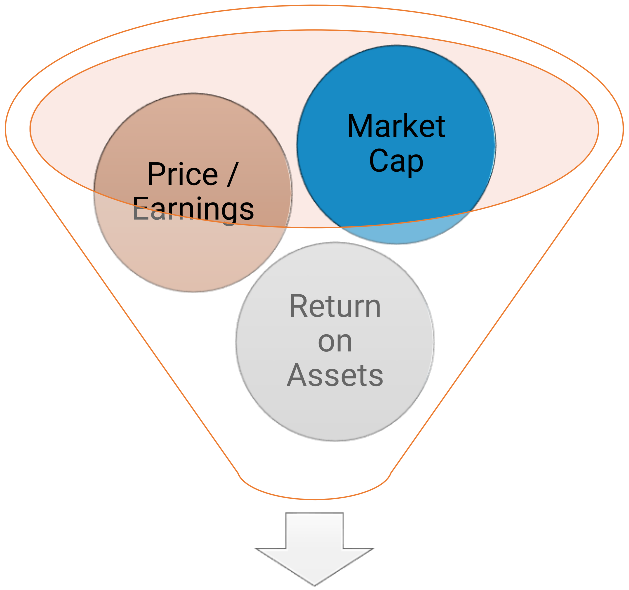
Case Study: Factor Investing

Baseball



Expected Winning %

Factor Investing



Expected Return %

"Moneyball" for Finance

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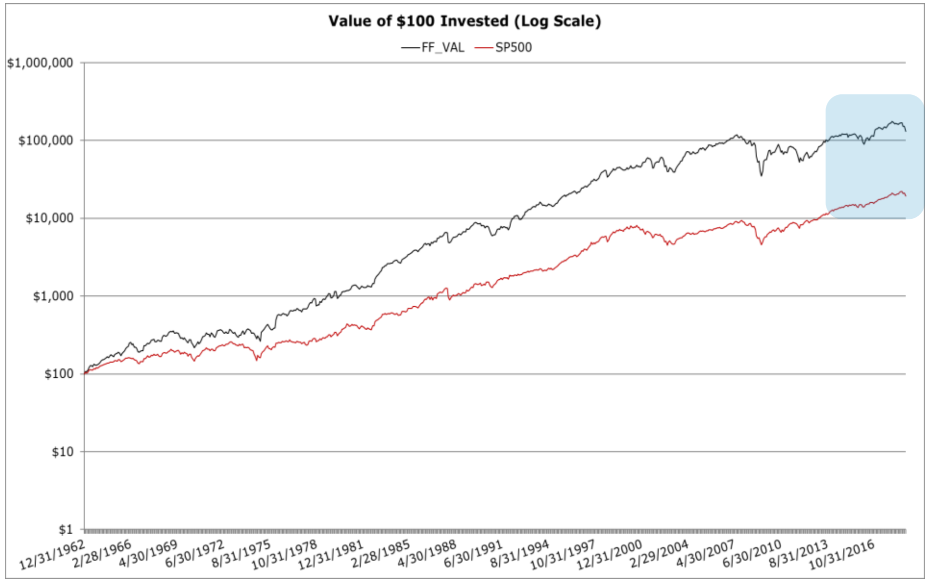
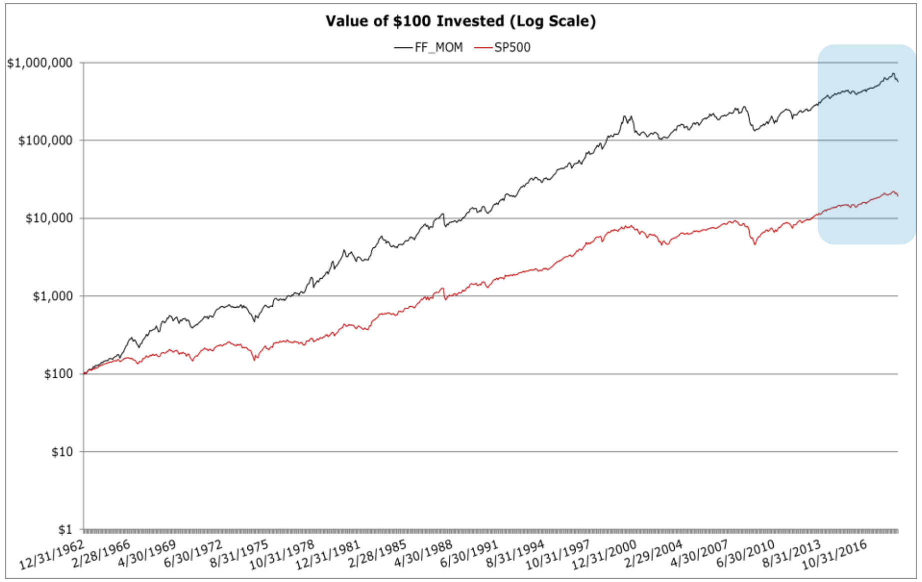
Value and Momentum are Common "Moneyball" Strategies

Academic Value Strategy:
"BUY CHEAP"



- FF_VAL= Top Decile Value Index, market-cap weighted
  - Ranked on book-to-market
  - Annually rebalanced
- SP500 = SP500 Total Return Index
- Simulated Performance: 1/1/1963 to 12/31/2018
- Total returns, including dividends and distributions

Academic Momentum Strategy:
"BUY STRONG"



- FF_MOM = Top Decile Momentum Index, market-cap weighted
  - Ranked on cumulative 12 months, skip last month
  - Monthly rebalanced
- SP500 = SP500 Total Return Index
- Simulated Performance: 1/1/1963 to 12/31/2018
- Total returns, including dividends and distributions

Can Investing Be This Simple?

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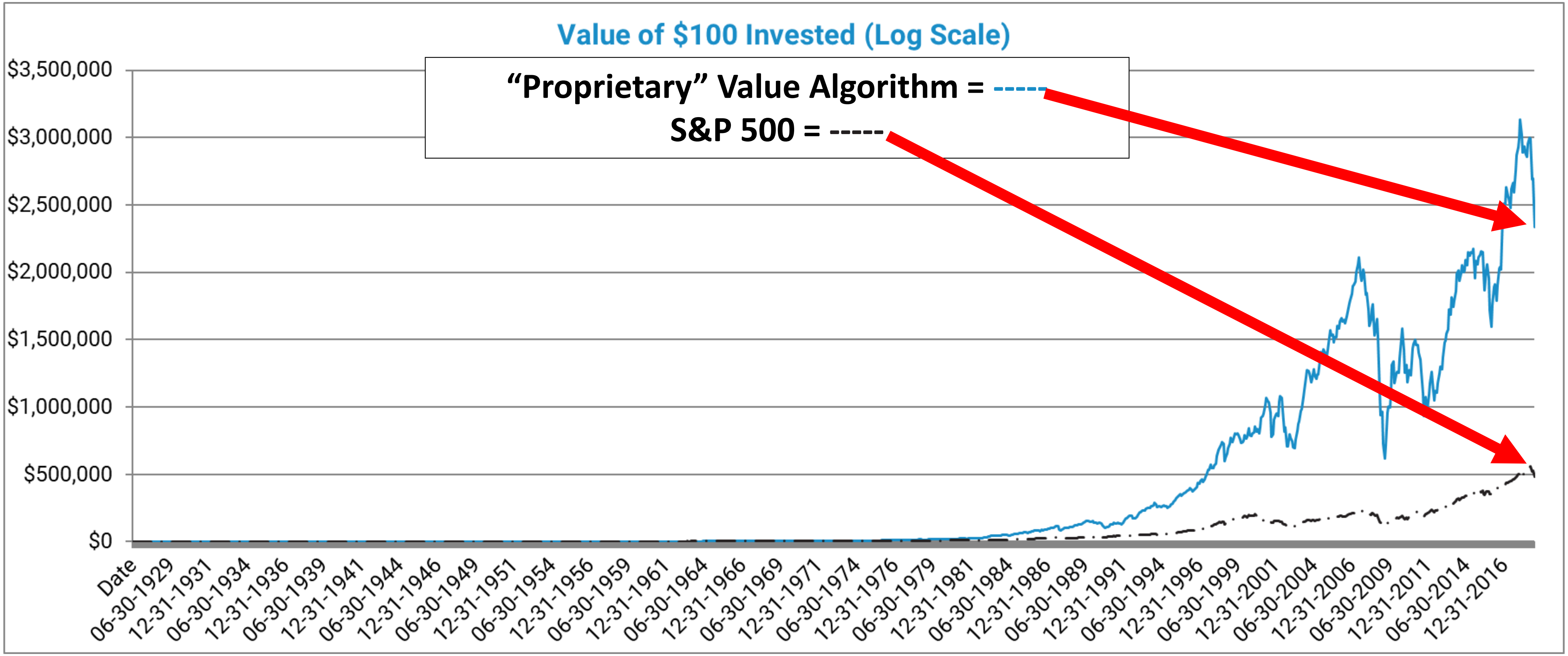
How Factor Investing is "Sold"



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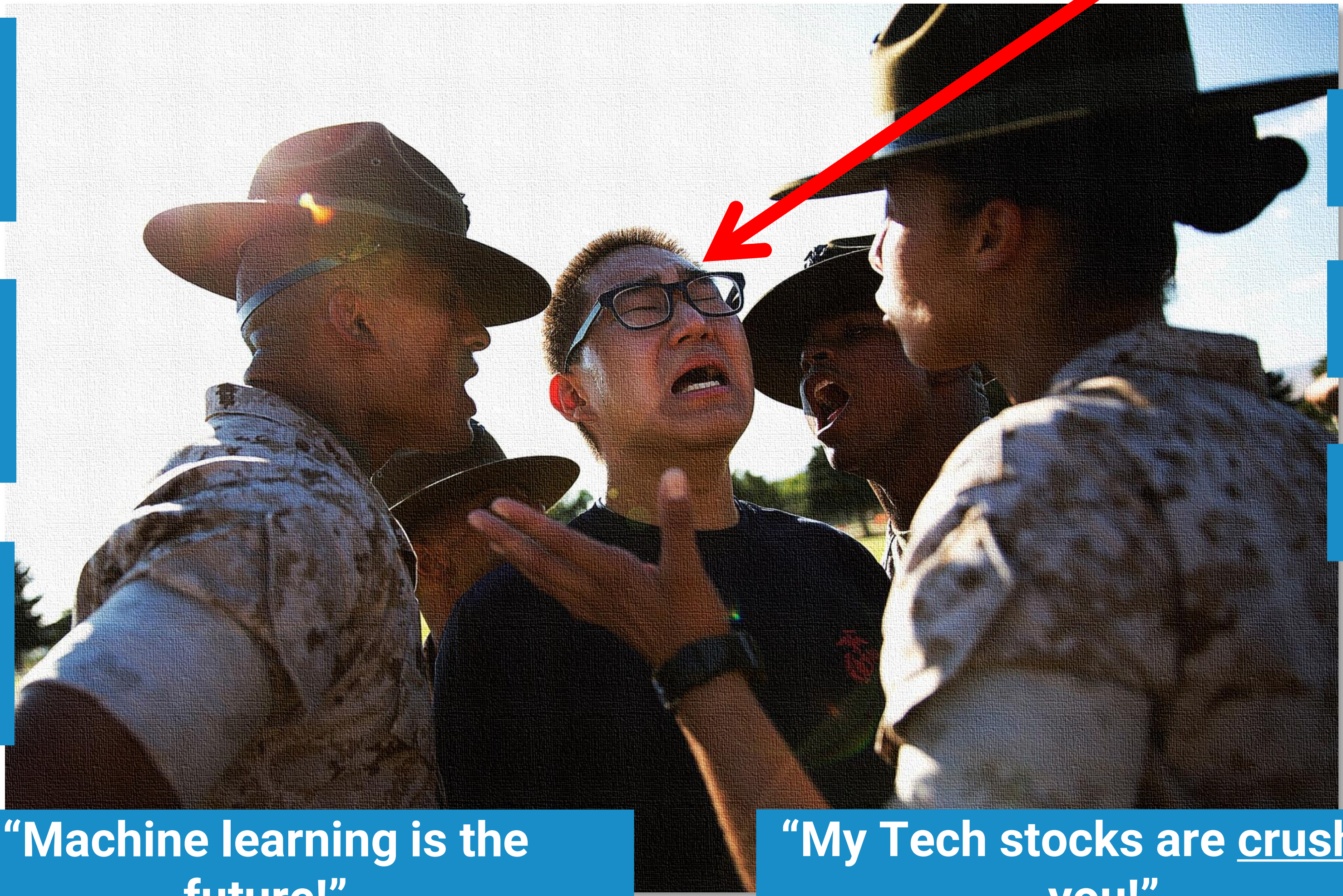
Performance figures contained herein are hypothetical, unaudited and prepared by Alpha Architect, LLC; hypothetical results are intended for illustrative purposes only. Past performance is not indicative of future results, which may vary. Index returns are for illustrative purposes only and do not represent actual fund performance. Index performance returns do not reflect any management fees, transaction costs, or expenses, which would reduce returns. Indexes are unmanaged and one cannot invest directly in an index. Source: Ken French Data and Bloomberg. The "proprietary" value algorithm is simply the top decile book-to-market portfolio from Ken French's website. The time period is from 1/1/1927 to 12/31/2018 and returns are total returns, including dividends and distributions.

Factor Investing "Reality"

Factor Investor



"Your model doesn't work!"

"Value is dead"

"Trend is dead"

"IPOs rock!"

"Winner take all economy"

"Valuations don't matter"

"Machine learning is the future!"

"My Tech stocks are <u>crushing you</u>!"

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Factor Reality: No Pain, No Gain

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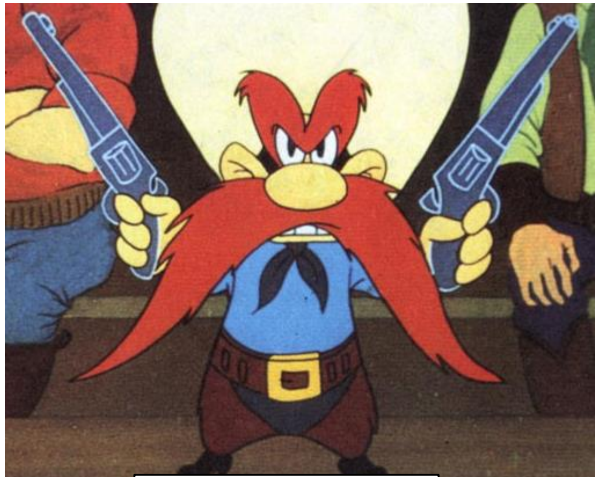
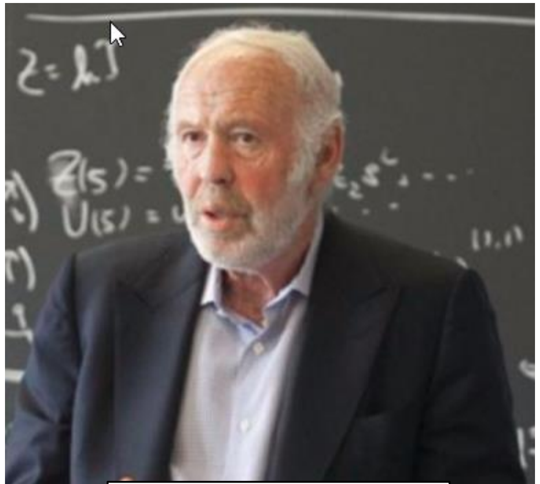
Factors are Too Simple – Competition Killed Them!

Old School



Maniac

New School



Jim Simons

50lb Brains Killed Factor Investing

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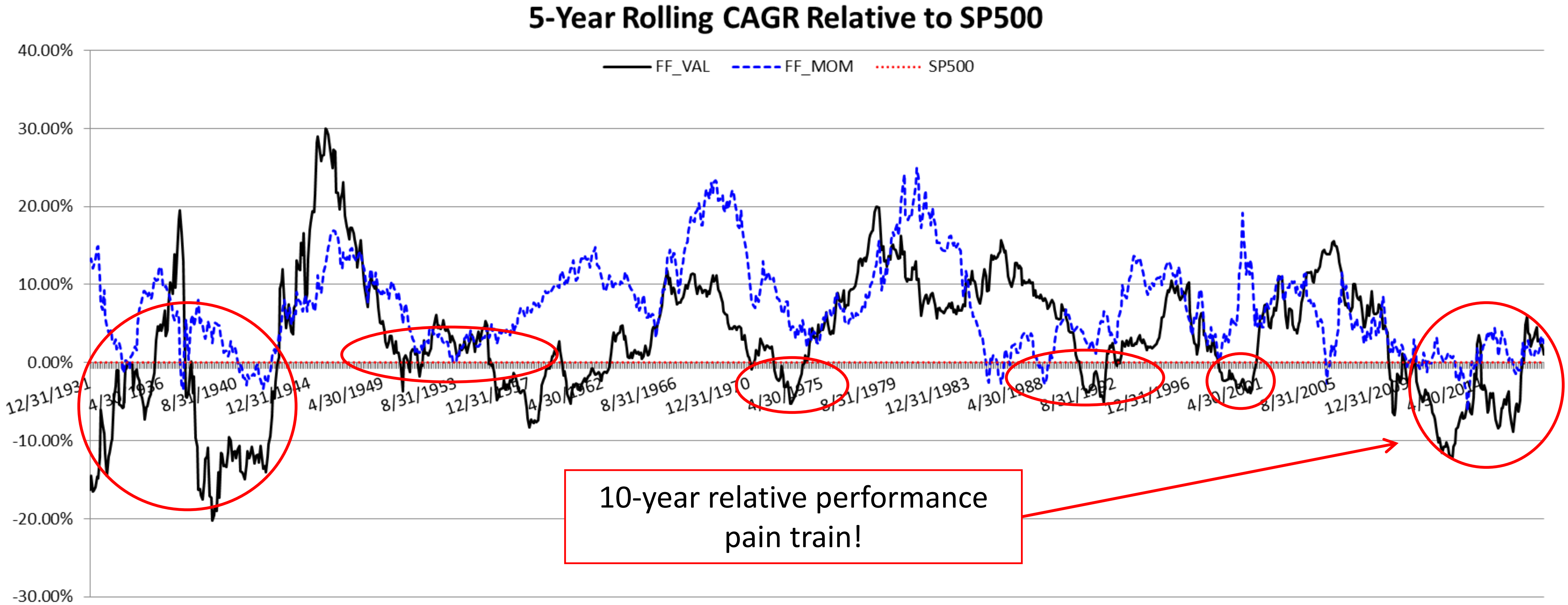
Did 50lb Brains Kill Factors in the 30’s, 40’s, 50’s, 70’s, and 90’s?



- FF_VAL = Top Decile Value, mid/large cap; Ranked on book-to-market; Annually rebalanced
- FF_MOM = Top Decile Momentum; Ranked on cumulative 12 months, skip last month; Monthly rebalanced
- SP500 = SP500 Total Return Index
- Simulated Performance: 1/1/1927 to 12/31/2018, Gross of fees, total returns, including dividends and distributions

Let's step back…

Why would any investment earn higher returns?

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Do
Nobel Prize winners
have the answer?

Nobel Prize ≠ Answer!

Markets are efficient.

No they aren't!
People are insane.

Why can't people beat the market?

Because **people are insane**!

Markets are Efficient

$20 on the ground

Efficient? Nope!

Grab the $20!

Arbitrage Costs = $0 = Efficient Prices

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Markets are Inefficient

Efficient?
Nope!

Easy to Arbitrage?
Nope!

Arbitrage Costs ≠ $0 = Behavioral Finance

Potential Answer:

Merge the Best Ideas!

We Believe Excess Returns are Risky & Tough To Exploit

Market Risks
(Risky)

+

Career Risk
(Tough to Exploit)

=

Potential Excess Return

Efficient Markets[1]

Behavioral Finance[2]

No Pain = No Gain
Extreme Pain = Extreme Gain

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[1]See Fama, Eugene, 1998, "Market efficiency, long-term returns, and behavioral finance," Journal of Financial Economics 49, 283-306 for background on the efficient markets story.
[2]See Shleifer, Andrei and Vishny, Robert, 1997, "The limits of arbitrage," The Journal of Finance 52, 35-55 for background on the behavioral finance story.

We Believe Excess Returns are Risky & Tough To Exploit

Market Risks
(Risky)

+

Career Risk
(Tough to Exploit)

=

Potential Excess Return

Efficient Markets[1]

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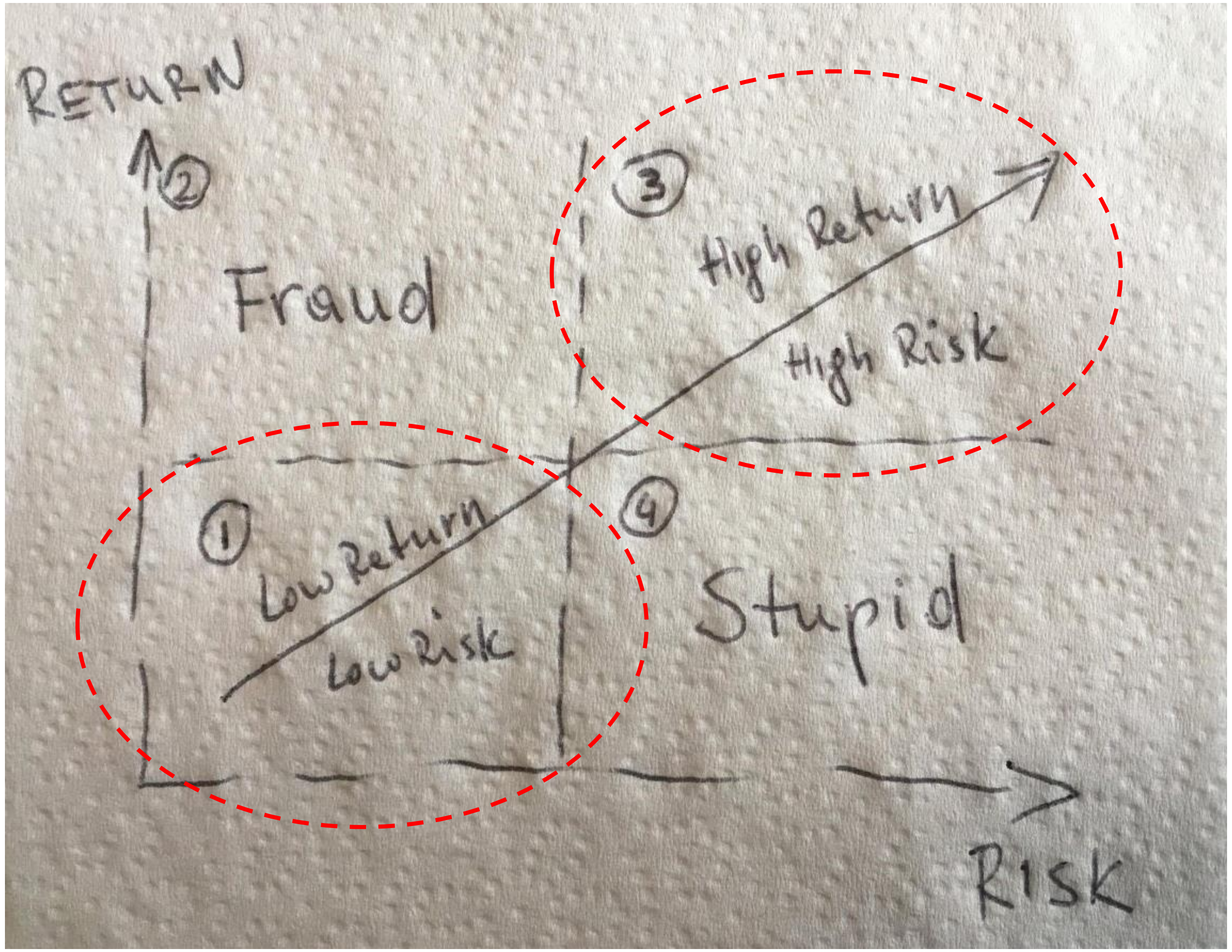
[2]See Shleifer, Andrei and Vishny, Robert, 1997, "The limits of arbitrage," The Journal of Finance 52, 35-55 for background on the behavioral finance story.

Market Risks: High Expected Returns Involve Higher Risks



Can market risks explain the entire story?

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We Believe Excess Returns are Risky & Tough To Exploit

Market Risks
(Risky)

+

Career Risk
(Tough to Exploit)

=

Potential Excess Return

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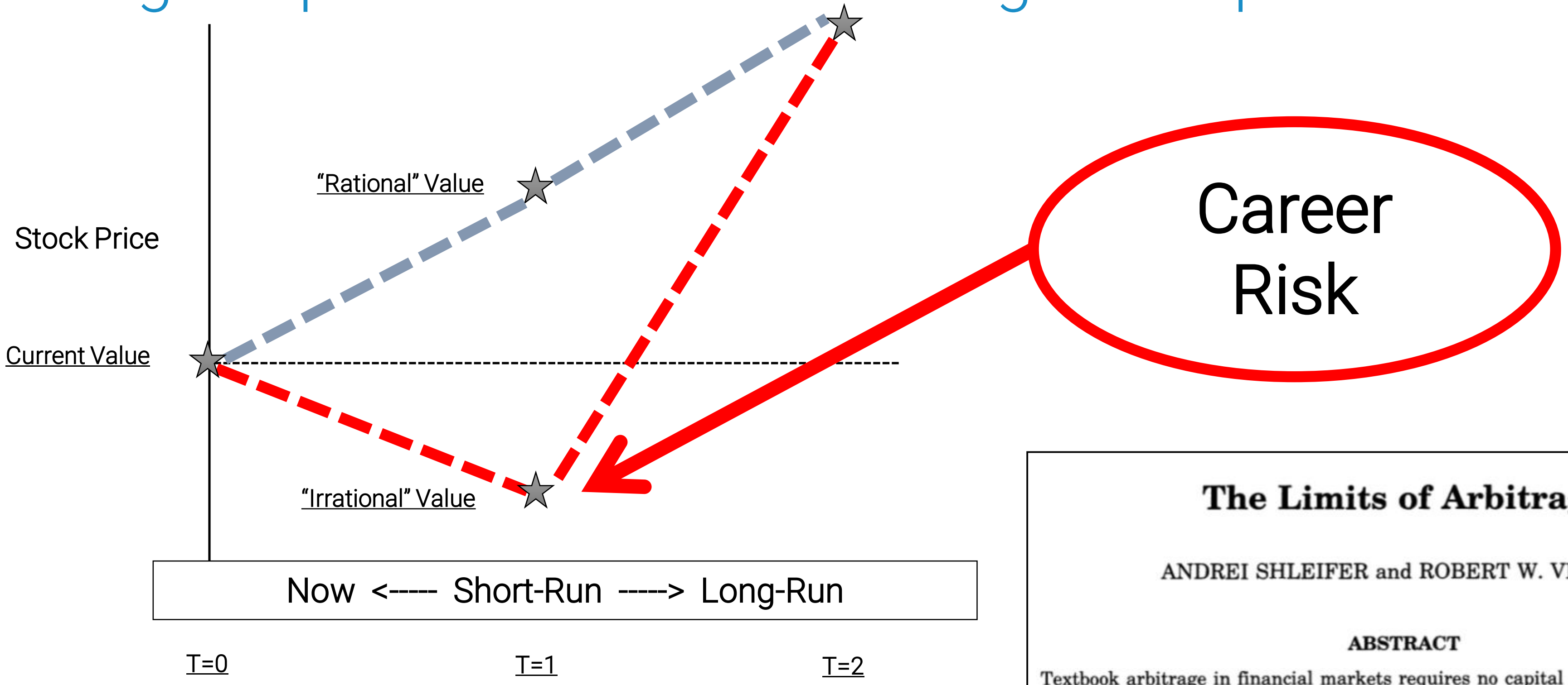
Career Risks: High Expected Returns Are Tough to Exploit



	T=0	T=1	T=2
#1	$100	$150	$200
#2	$100	$50	$200

The Limits of Arbitrage

ANDREI SHLEIFER and ROBERT W. VISHNY*

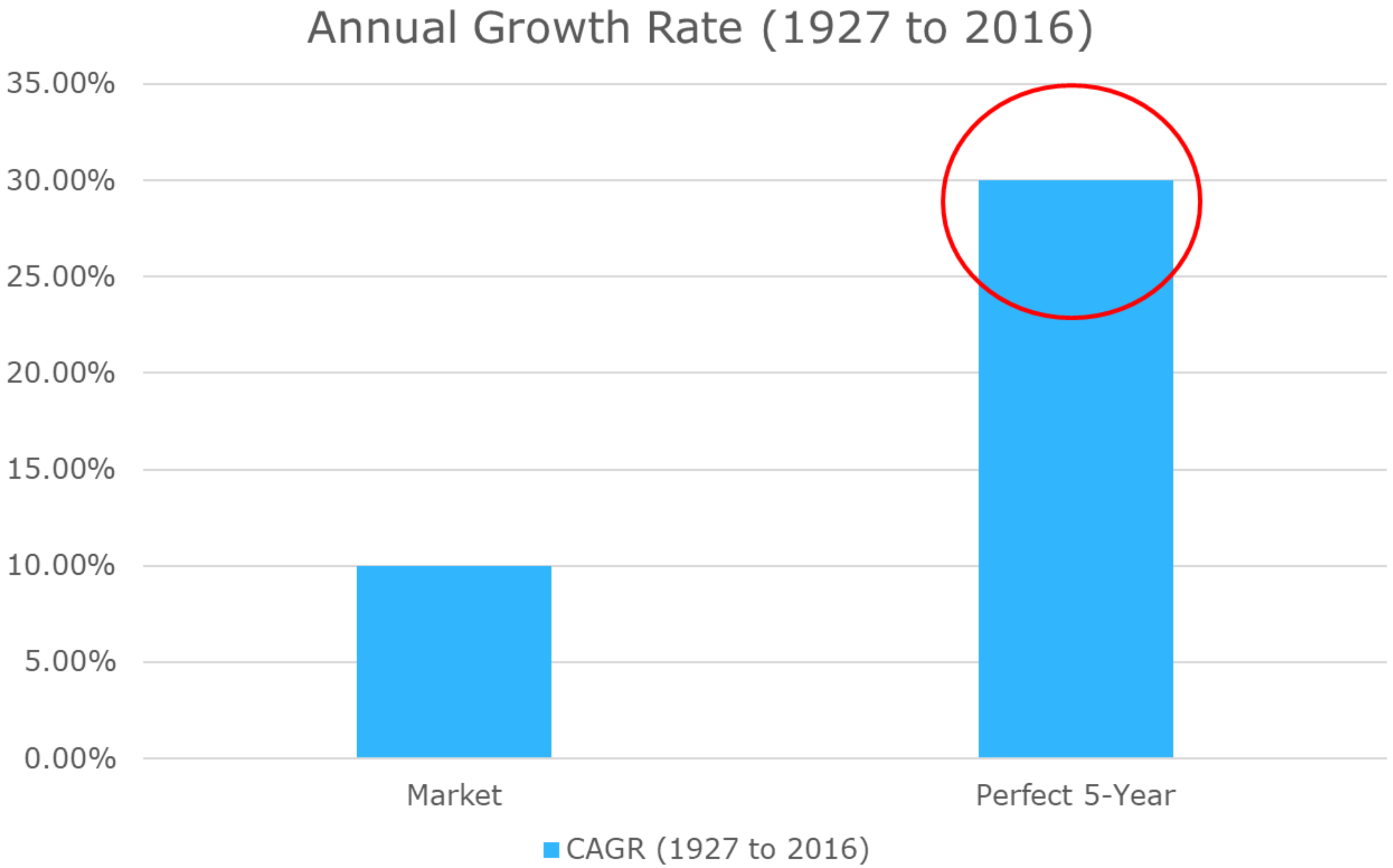
ABSTRACT

Textbook arbitrage in financial markets requires no capital and entails no risk. In reality, almost all arbitrage requires capital, and is typically risky. Moreover, professional arbitrage is conducted by a relatively small number of highly specialized investors using other people's capital. Such professional arbitrage has a number of interesting implications for security pricing, including the possibility that arbitrage becomes ineffective in extreme circumstances, when prices diverge far from fundamental values. The model also suggests where anomalies in financial markets are likely to appear, and why arbitrage fails to eliminate them.

Arbitrage is Not Free in the Real World

Source: Shleifer A., R. Vishny, 1997, The Limits of Arbitrage, Journal of Finance 52, pg. 35-55

God Can Identify Mispricing Better than Anyone!



Source: The results are hypothetical results and are NOT an indicator of future results and do NOT represent returns that any investor actually attained. In fact, these results are IMPOSSIBLE to attain because they have explicit look ahead bias. The deciles are based on 5-year look-ahead of total returns. All returns are total returns and include the reinvestment of distributions (e.g., dividends).

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But Even God Can't Destroy Volatility!

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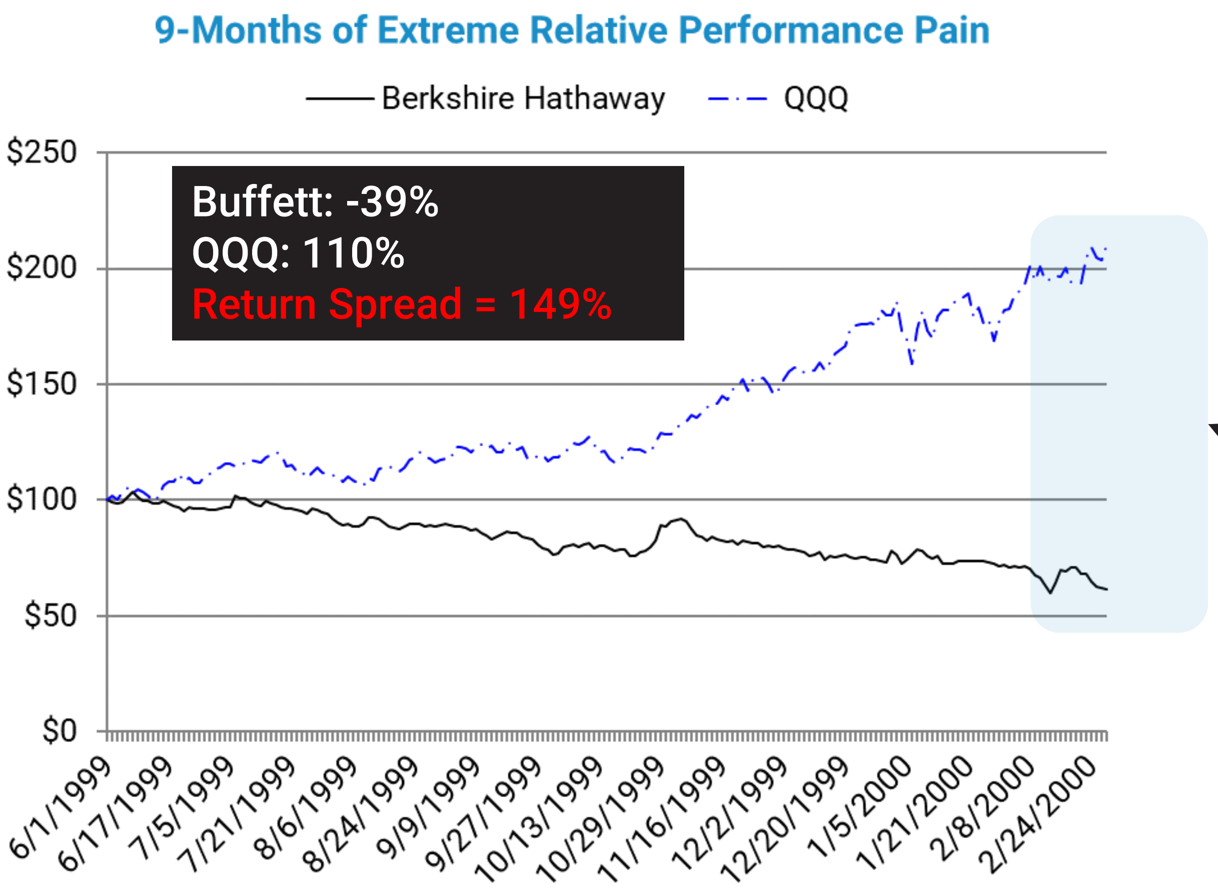
Don’t Believe in Career Risks?

Relative Performance: Being Unique, Means Being Different



Warren Buffett

"Charlie, should we buy tech?"

"Warren Buffett may be losing his magic touch."

BARRON'S

Sustainable Investing Requires Perspective

Source: Factset. 6/1/1999 to 2/29/2000. The results are hypothetical results and are NOT an indicator of future results and do NOT represent returns that any investor actually attained. Please see disclosures for additional information. Additional information regarding the construction of these results is available upon request.

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~~"Do Factors Work?"~~

Why Would Factors, which are risky and tough to exploit, NOT Work?

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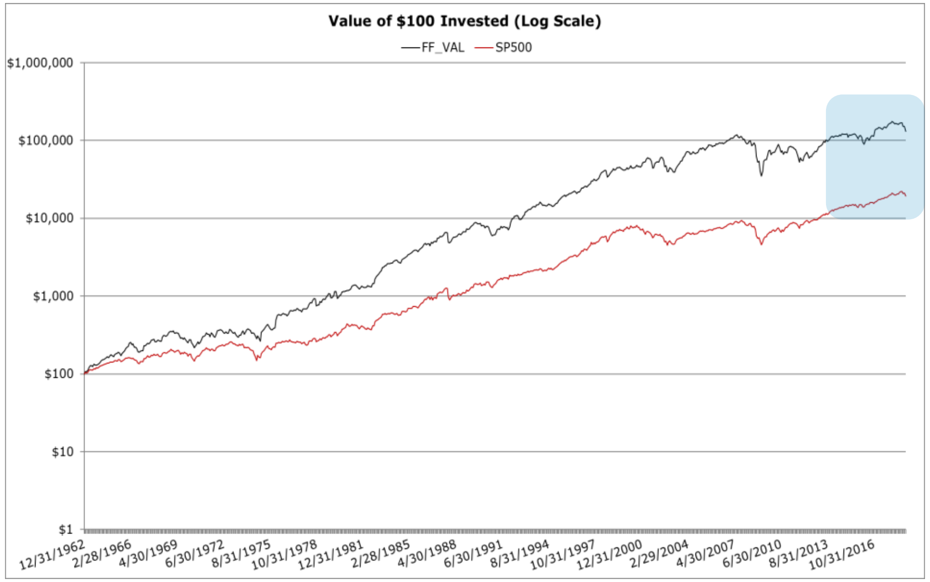
We Believe Value and Momentum Strategies are Risky & Tough to Exploit

Academic research portfolios, like those below, are generally unconstrained ***focused*** factor portfolios.

Academic Value Strategy: "BUY CHEAP"



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  - Annually rebalanced
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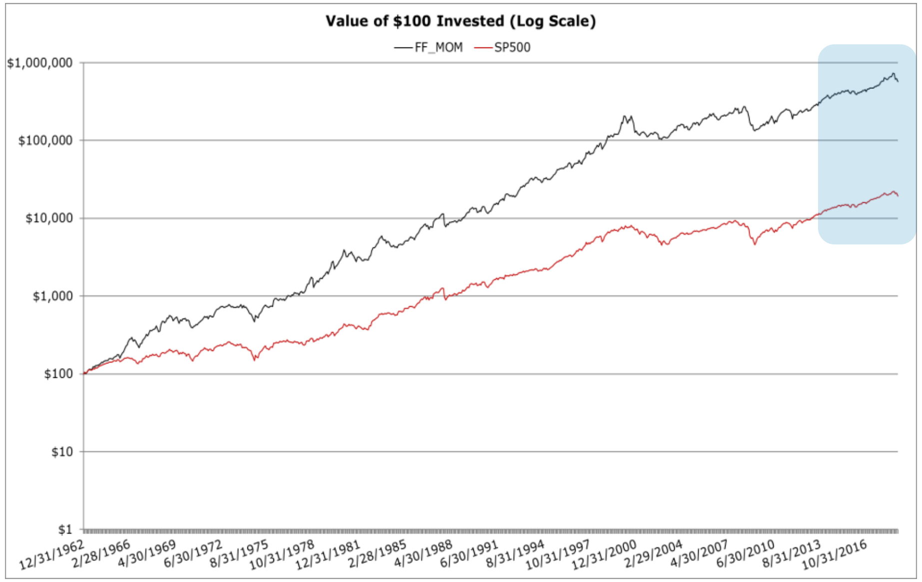
- Total returns, including dividends and distributions

Academic Momentum Strategy: "BUY STRONG"



- FF_MOM = Top Decile Momentum Index, market-cap weighted
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  - Monthly rebalanced
- SP500 = SP500 Total Return Index
- Simulated Performance: 1/1/1963 to 12/31/2018
- Total returns, including dividends and distributions

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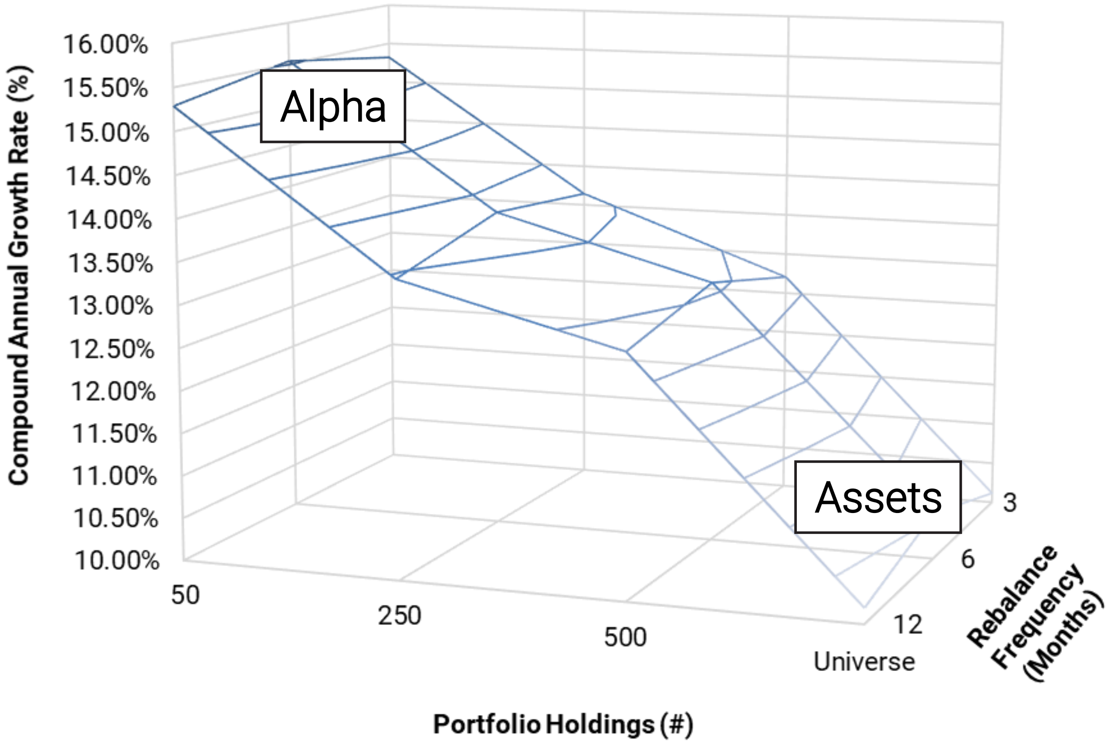
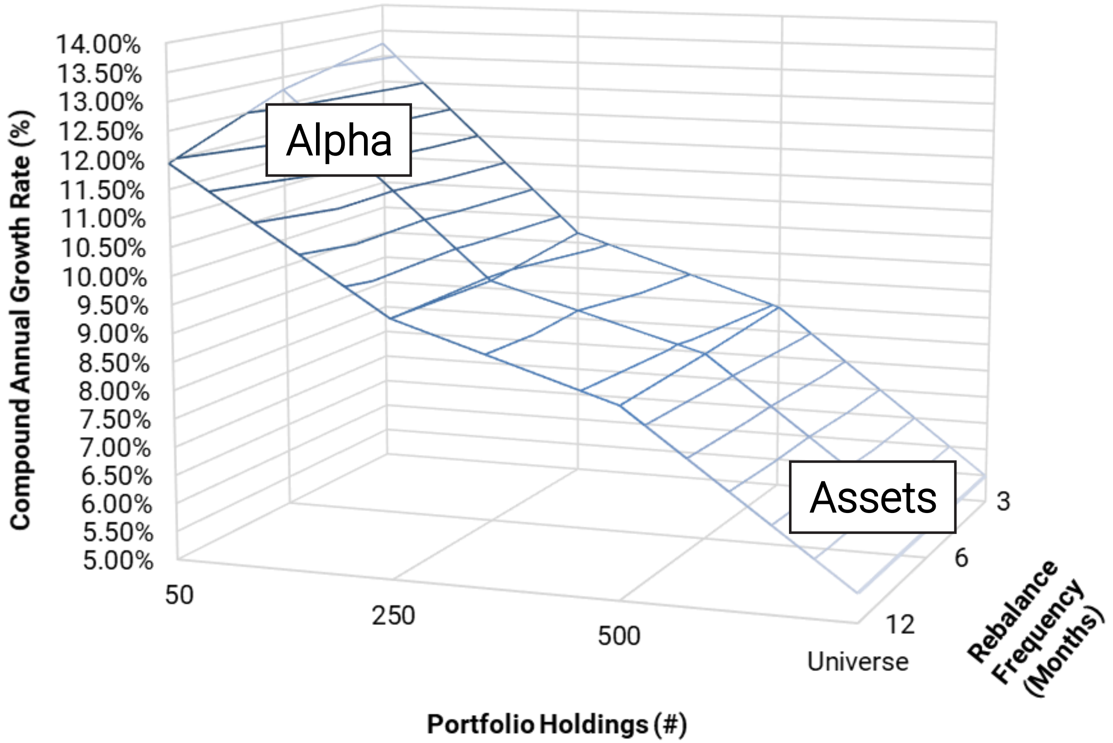
We Believe in **Focused** Value Factor Premiums

Simulated EBIT/TEV sorted portfolio compound annual returns by concentration and rebalance

Portfolio Construction and Historical Returns (US Stocks)



Portfolio Construction and Historical Returns (International Stocks)



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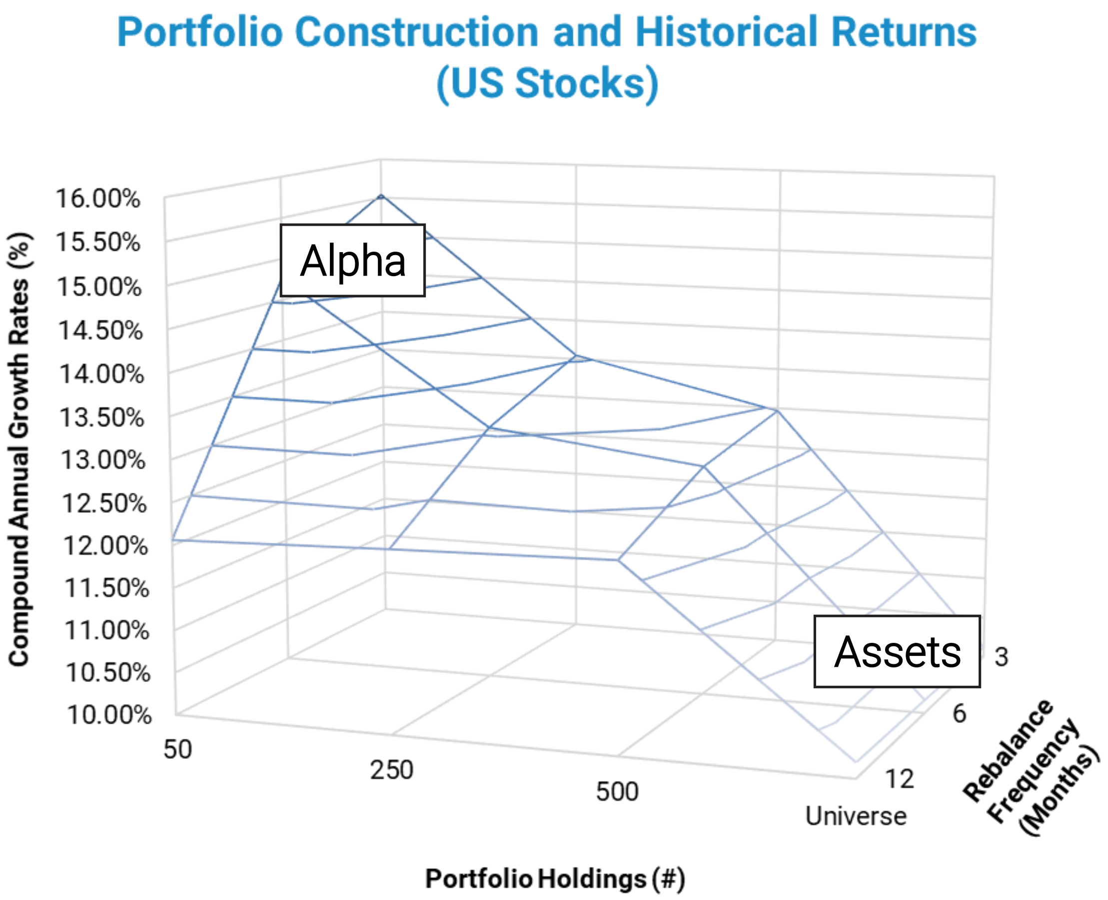
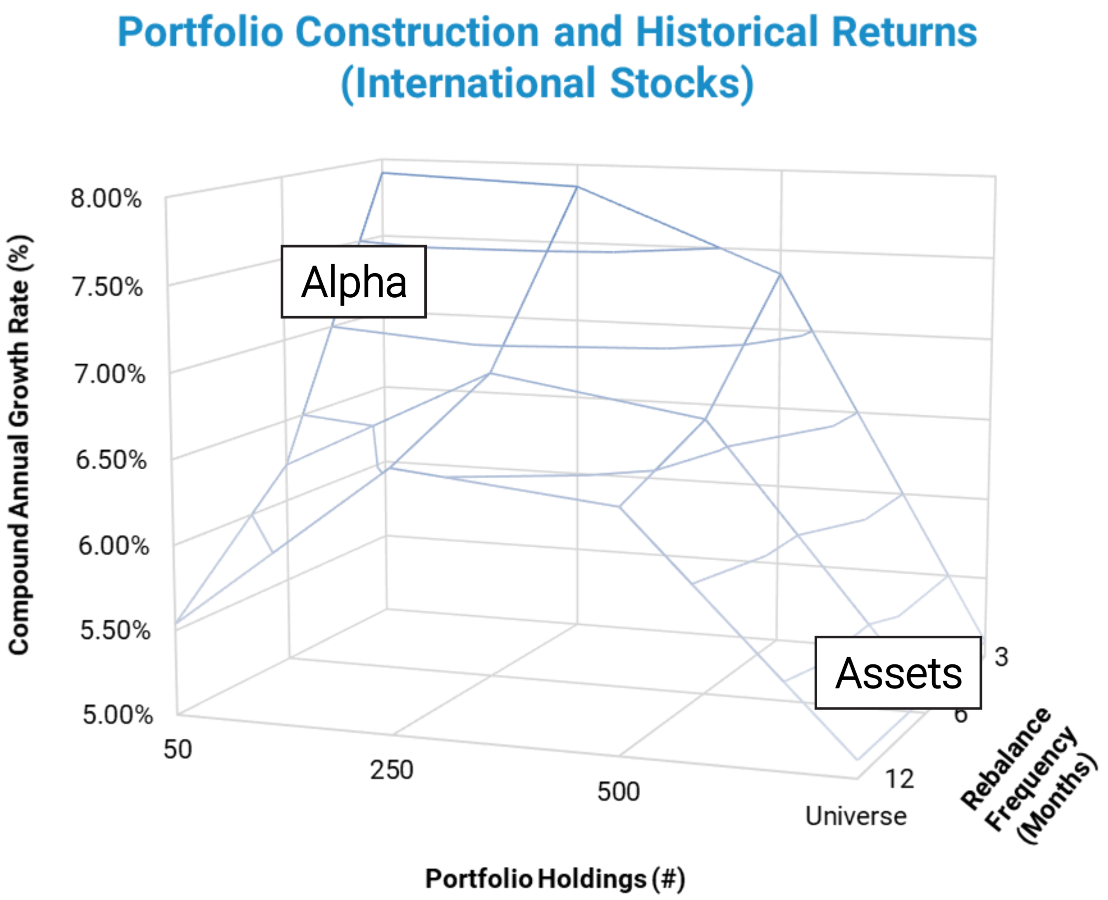
Source: Factset. Universe is the largest 1000 U.S. or international developed firms by market capitalization and broken into portfolios of 50-, 250-, or 500-stocks based on EBIT/TEV ranking (higher is better). The rebalance frequency is 3-, 6-, or 12-months. We average overlapping portfolio results and show the compound annual returns for the respective portfolios. The period is from 1/1/1990 to 3/31/2019. The results are hypothetical results and are NOT an indicator of future results and do NOT represent returns that any investor actually attained. Additional information regarding the construction of these results is available upon request. Indexes are unmanaged, do not reflect management or trading fees, and one cannot invest directly in an index. All returns are gross total returns and include the reinvestment of distributions (e.g., dividends).

We Believe in **Focused** Momentum Factor Premiums

Simulated momentum sorted portfolio compound annual returns by concentration and rebalance





Source: Factset. Universe is the largest 1000 U.S. or international developed firms by market capitalization and broken into portfolios of 50-, 250-, or 500-stocks based on the past 12 month returns (skipping the most recent month). The rebalance frequency is 3-, 6-, or 12-months. We average overlapping portfolio results and show the compound annual returns for the respective portfolios. The period is from 1/1/1990 to 3/31/2019. The results are hypothetical results and are NOT an indicator of future results and do NOT represent returns that any investor actually attained. Additional information regarding the construction of these results is available upon request. Indexes are unmanaged, do not reflect management or trading fees, and one cannot invest directly in an index. All returns are gross total returns and include the reinvestment of distributions (e.g., dividends).

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Great,
Where Do I Sign Up?

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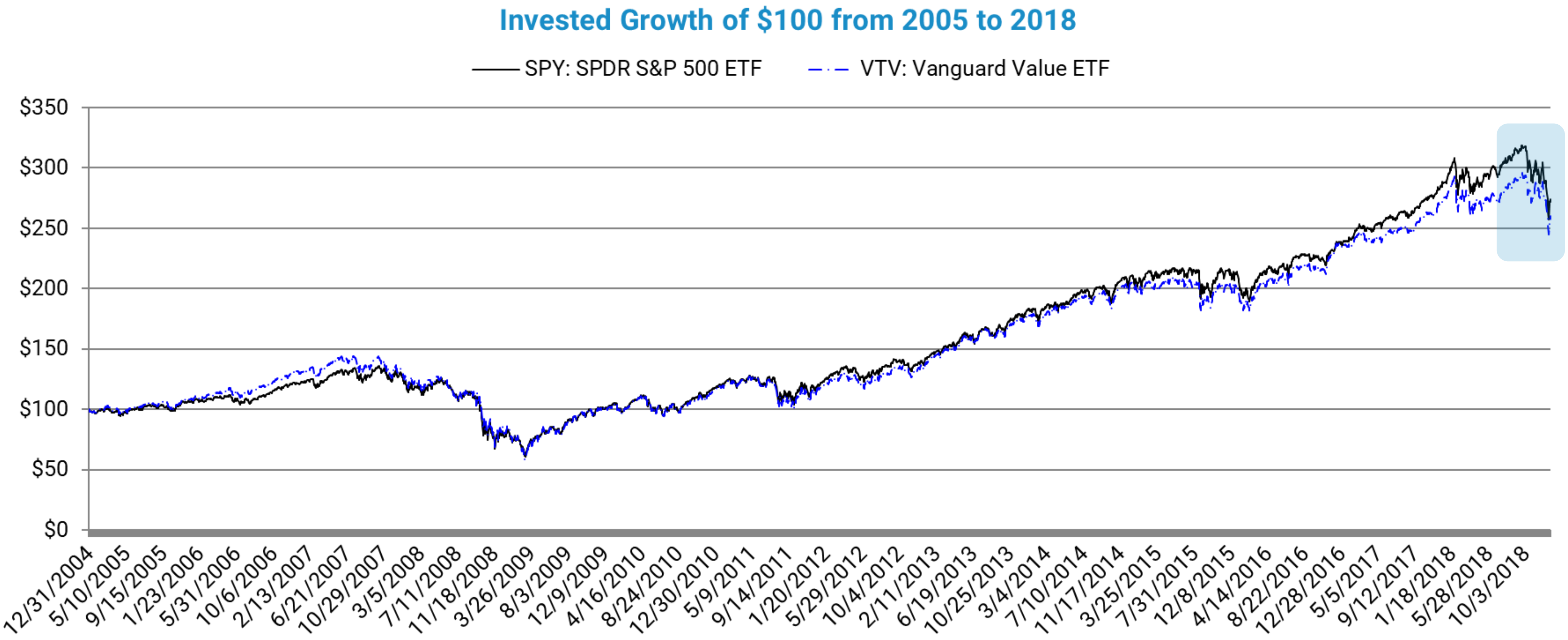
Closet Indexes[1] will NOT Deliver Focused Factor Results…



[1]A “closet index” is generally considered to be a strategy that is marketed as being different than a broad passive index, but in reality, is closely related to a broad passive index with minimal deviations in the underlying holdings and performance profile. VTV was chosen because it is the largest “smart beta” ETF as per https://www.etf.com/channels/smart-beta-etfs (accessed June 1, 2019). Performance is measured from 1/1/2005 to 12/31/2018 and is based on total returns, including dividends and distributions. Performance figures contained herein are hypothetical, unaudited and prepared by Alpha Architect, LLC; hypothetical results are intended for illustrative purposes only. Past performance is not indicative of future results, which may vary. For more information see the following paper: K.J. Martijn Cremers & Quinn Curtis, Do Mutual Fund Investors Get What They Pay For? The Legal Consequences of Closet Index Funds (November 24, 2015) at 1, available at http://ssrn.com/abstract=2695133 (last visited June 1, 2019).

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As of Date: 9/30/2019

Our Focused Factor Indexes Seek to be Different than Closet Indexes

Index Name	Index Ticker	Rebalance Frequency	# of Holdings	Active Share (%)	Benchmark Used for Active Share
U.S Quantitative Value	QV INDEX	Quarterly	40	96.04%	S&P 500 Index
International Quantitative Value Index	IQV INDEX	Semi-Annually	45	96.47%	MSCI EAFE Index
U.S Quantitative Momentum Index	QM INDEX	Quarterly	50	97.68%	S&P 500 Index
International Quantitative Momentum Index	IQM INDEX	Quarterly	45	93.94%	MSCI EAFE Index
Global Value Momentum Trend Index	GVMT INDEX	Monthly	180	172.52%	MSCI World Index

Source: FactSet. The results are hypothetical results and are NOT an indicator of future results and do NOT represent returns that any investor attained. Please see disclosures for additional information. Additional information regarding the construction of these results is available upon request. Indexes are unmanaged, do not reflect management or trading fees, and one cannot invest directly in an index. Holdings and active share are from FactSet and derived via the ETFs that track the respective Indexes. Active share is the percentage of a portfolio's stock holdings that differ from its benchmark index. It is based on the weightings of securities in a portfolio compared with those of its benchmark and can be used as a measure of the degree of a portfolio's active management. See Cremers, K. J. Martijn, and Antti Petajisto, 2009, "How active is your fund manager? A new measure that predicts performance," Review of Financial Studies 22, 3329-3365 for more information.

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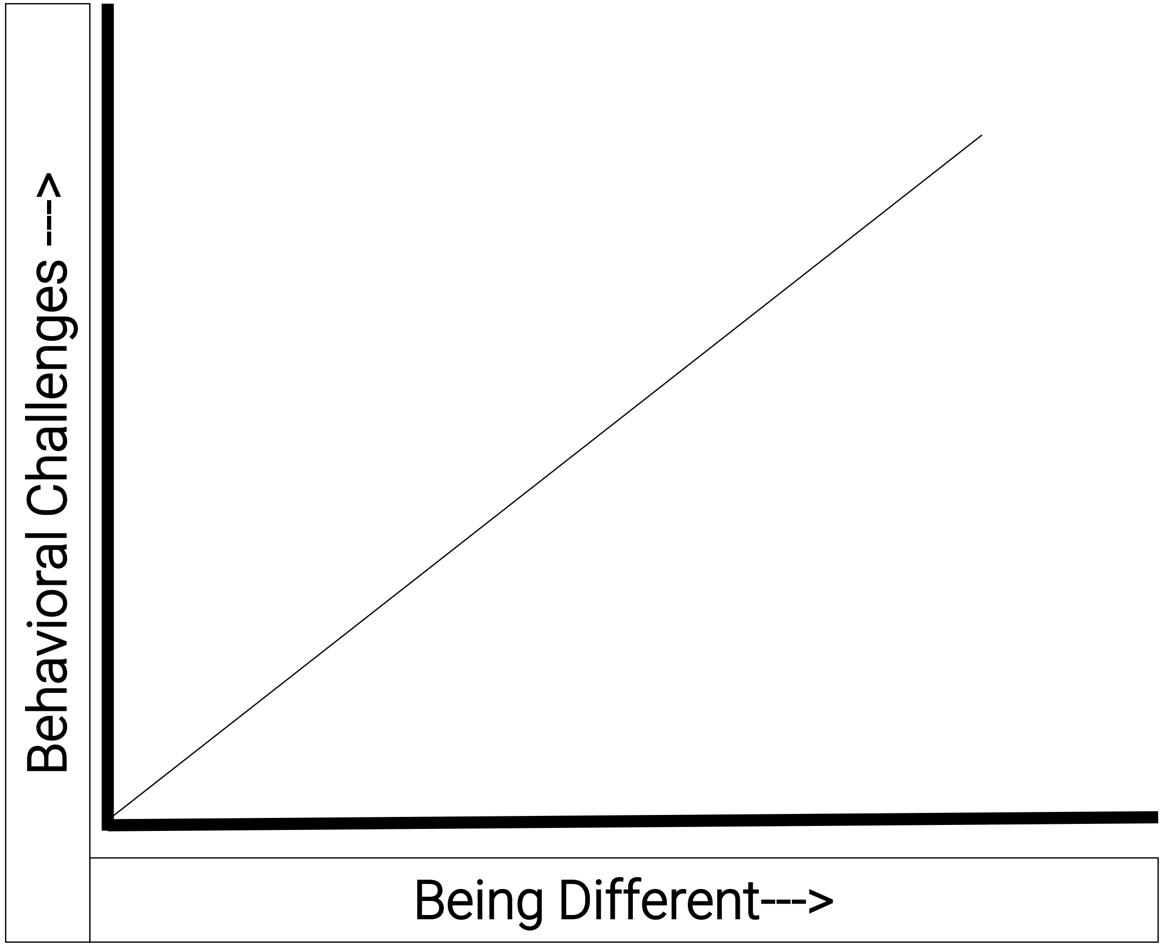
Focused Factors Create a Problem…and an Opportunity!



Build Your Brain: Be Informed; Avoid Being a Victim

TRUST

Fiduciary relationship; authentic communication; establish a process.

TEACH

Empower through education; help clients make better decisions.

TRANSPARENCY

Attribution analysis; portfolio transparency; long-term data analysis.

Education Develops Sustainable Investors

Our Approach		Our Clients		Our Goal
Sustainable Process	+	**Sustainable Investors**	=	**Expected Long-Term Performance**

Education is critical for cultivating long-term, sustainable investors

"Alpha" is Earned via Patience & Discipline

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1. What is Factor Investing?
   - Moneyball for finance
2. Do Factors Work?
   - Yes, but not a free lunch.
3. Factor Portfolio Considerations
   - Pain is roughly matched with gains.
4. Managing Factor Investor Behavior
   - Discipline and education required.

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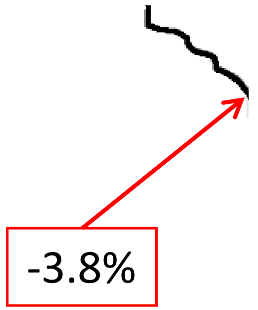

2008 Financial Crisis. Calling All Market Historians!

FIRM MISSION

WE EMPOWER INVESTORS THROUGH EDUCATION

In order to

Develop Sustainable Investors

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CONTACT US TO LEARN MORE

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IMPORTANT INFORMATION - DISCLOSURES

There are risks involved with investing, including loss of principal. There is no assurance that the objectives of any strategy or fund will be achieved or will be successful. No investment strategy, including diversification, can protect against market risk or loss. Current and future portfolio holdings are subject to risk. Past performance does not guarantee future results.

There is a risk of substantial loss associated with trading commodities, futures, options and other financial instruments. Before trading, investors should carefully consider their financial position and risk tolerance to determine if the proposed trading style is appropriate. Investors should realize that when trading futures, commodities and/or granting/writing options one could lose the full balance of their account. It is also possible to lose more than the initial deposit when trading futures and/or granting/writing options. All funds committed to such a trading strategy should be purely risk capital.

Certain economic and market information contained herein has been obtained from published sources prepared by other parties, which in certain cases have not been updated through the date hereof. While such sources are believed to be reliable, neither Alpha Architect nor its affiliates assumes any responsibility for the accuracy or completeness of such information and such information has not been independently verified by Alpha Architect.

Index returns are for illustrative purposes only and do not represent actual fund performance. References to an index do not imply that the portfolio will achieve returns, volatility or other results similar to that index. The composition of the index may not reflect the manner in which a portfolio is constructed in relation to expected or achieved returns, portfolio guidelines, restrictions, sectors, correlations, concentrations, volatility or tracking error targets, all of which are subject to change. Index performance returns do not reflect any management fees, transaction costs, or expenses, which would reduce returns.

Indexes are unmanaged and one cannot invest directly in an index. There are no active components of indexes; therefore, using them as a proxy can be of limited value because there is no guarantee that the portfolio would have been managed to match the index. Realized returns and/or volatility may come in higher or lower than expected.

Annual performance is calculated based on monthly return streams, geometrically linked as of the end of the specified month end.

Results, unless cited otherwise, are shown gross of fees and do not reflect the effect of investment fees which would lower performance. Performance reflects the reinvestment of dividends and other earnings. The following hypothetical illustrates the compound effect fees have on investment return: For an account charged 1% with a stated annual return of 10%, the net total return before taxes would be reduced from 10% to 9%. A ten year investment of $100,000 at 10% would grow to $259,374, and at 9%, to $236,736 before taxes. For a complete description of all fees and expenses, please refer to Alpha Architect's Form ADV Part 2A.

IMPORTANT INFORMATION - DISCLOSURES

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Past performance is not indicative of future results, which may vary.

Hypothetical performance results (e.g., quantitative backtests) have many inherent limitations, some of which, but not all, are described herein. No representation is being made that any fund or account will or is likely to achieve profits or losses similar to those shown herein. In fact, there are frequently sharp differences between hypothetical performance results and the actual results subsequently realized by any particular trading program. One of the limitations of hypothetical performance results is that they are generally prepared with the benefit of hindsight. In addition, hypothetical trading does not involve financial risk, and no hypothetical trading record can completely account for the impact of financial risk in actual trading. For example, the ability to withstand losses or adhere to a particular trading program in spite of trading losses are material points which can adversely affect actual trading results. The hypothetical performance results contained herein represent the application of the quantitative models as currently in effect on the date first written above and there can be no assurance that the models will remain the same in the future or that an application of the current models in the future will produce similar results because the relevant market and economic conditions that prevailed during the hypothetical performance period will not necessarily recur. There are numerous other factors related to the markets in general or to the implementation of any specific trading program which cannot be fully accounted for in the preparation of hypothetical performance results, all of which can adversely affect actual trading results. Hypothetical performance results are presented for illustrative purposes only.

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The information contained in this communication is not meant to substitute for a thorough estate planning and is not meant to be legal and/or estate advice. It is intended to provide you with a preliminary outline of your goals. Please consult your legal counsel for additional information.

This presentation is only intended for pre-approved presentations and may not be duplicated in any form by any means or redistributed without Alpha Architect's prior written consent

IMPORTANT DISCLOSURES

- Simulated Historical Performance: All returns are total returns and include the reinvestment of distributions (e.g., dividends).
- Index Characteristics Data Source: Characteristics are from FactSet and derived via the ETFs that track the respective Indexes. Characteristics are holdings-weighted. The data for the performance and factor attribution analysis are from Alpha Architect and Solactive.
- The S&P 500 Index (SP500) is a capitalization-weighted index that measures the performance of the broad U.S. equity market.
- The MSCI EAFE Index (EAFE) is a capitalization-weighted index that measures the performance of developed market equities, excluding the U.S. and Canada.
- The MSCI World Index is a capitalization-weighted index that measures the performance of developed market equities.
- EBIT/TEV is defined as earnings before interest and taxes divided by total enterprise value.
- Momentum (2-12) is defined as the cumulative total return for the past 12 months, excluding the last (12th) month.
- Size is defined as the total market value of the company's listed equity.
- Return on assets is defined as net income divided by total assets.
- Compound annualized growth rate, or CAGR, is defined as the annualized growth of an initial investment to the ending investment value if you assume that the investment has been compounding over the time period.
- Standard Deviation: Sample standard deviation
- Downside Deviation: Sample standard deviation, but only monthly observations below 41.67bps (5%/12) are included in the calculation
- Sharpe Ratio (annualized): Average monthly return minus treasury bills divided by standard deviation
- Sortino Ratio (annualized): Average monthly return minus treasury bills divided by downside deviation
- Appraisal Ratio (annualized): CAPM regression intercept estimate divided by regression residual volatility
- Worst Drawdown: Worst peak to trough performance (measured based on monthly returns)
- Rolling X-Year Win %: Percentage of rolling X periods that a strategy outperforms
- Sum (5-Year Rolling MaxDD): Sum of all 5-Year rolling drawdowns
- Down %: The Down Number Ratio is a measure of the number of periods that the investment was down when the benchmark was down, divided by the number of periods that the benchmark was down. The smaller the ratio, the better
- Up %: The Up Number Ratio is a measure of the number of periods that the investment was up when the benchmark was up, divided by the number of periods that the benchmark was up. The larger the ratio, the better
- Tracking Error: Tracking Error is measured by taking the square root of the average of the squared deviations between the investment's returns and the benchmark's returns
- Negative Correlation: Correlation of returns relative to benchmark returns when the benchmark is negative
- Positive Correlation: Correlation of returns relative to benchmark returns when the benchmark is positive
- Performance figures contained herein are hypothetical, unaudited and prepared by Alpha Architect, LLC; hypothetical results are intended for illustrative purposes only. Past performance is not indicative of future results, which may vary. Index returns are for illustrative purposes only and do not represent actual fund performance. Index performance returns do not reflect any management fees, transaction costs, or expenses, which would reduce returns. Indexes are unmanaged and one cannot invest directly in an index.

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