

# REPLACING THE THEORY OF EFFICIENT MARKETS--- IMPLICATIONS FOR THEORY AND PRACTICE

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# Plan of the talk



- Momentum, reversal and value.

Prominent market anomalies.

- An institutional theory.

Rational explanation of the anomalies.

- Practical applications of the theory.

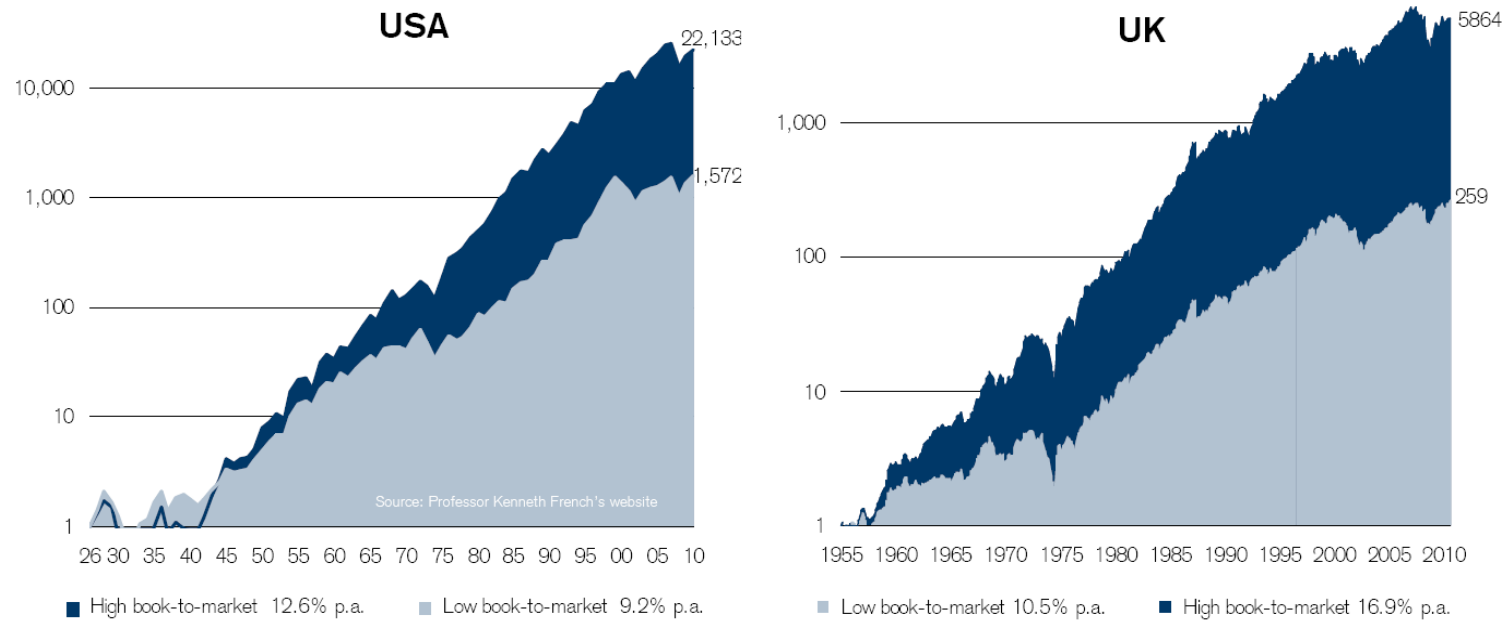
Efficient portfolio management in an inefficient market.

# Momentum, Reversal and Value



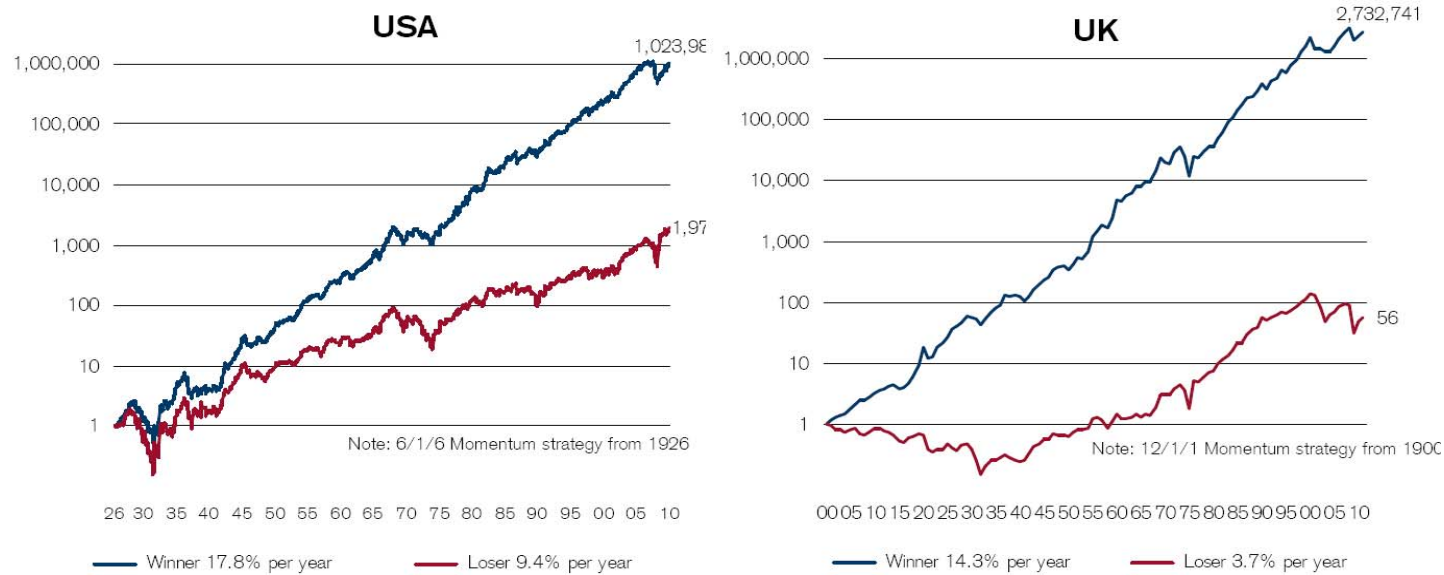
- **Momentum:** Tendency of recent performance to continue in the near future.
- **Reversal:** Tendency of performance over a longer history to revert.
- **Value** (closely related to reversal): Ratio of prices to fundamentals predicts inversely future performance.
- Prominent market anomalies!

# Value



Source: Dimson, Marsh and Staunton, Global Investment Returns Sourcebook, Credit Suisse Research Institute, 2011

# Momentum



Source: Dimson, Marsh and Staunton, Global Investment Returns Sourcebook, Credit Suisse Research Institute, 2011

# Sharpe Ratios



## □ Momentum

- ▣ 70% for individual stocks (average of US, UK, Japan, Continental Europe).
- ▣ 34% for country-level indices.

## □ Value

- ▣ 36% for individual stocks (average of US, UK, Japan, Continental Europe).
- ▣ 34% for country-level indices.

Source: Asness, Moskowitz and Pedersen (2009), Value and Momentum Everywhere. Data from 1970/1980s to 2008.

# Explanations



- Momentum and reversal are hard to explain within standard Finance models.
- Two leading approaches:
  - ▣ Behavioural Finance.
  - ▣ **Market frictions.**

# Behavioural Finance



- Momentum and reversal can arise if investors react incorrectly to information signals.
- Example:
  - ▣ Investors are too optimistic about some assets (overpricing them) and too pessimistic about others (underpricing them) → Reversal.
  - ▣ Optimism/pessimism builds gradually → Momentum.



# Market Frictions



- Key friction: Delegation and agency.
- Vayanos and Woolley (2011), An Institutional Theory of Momentum and Reversal.
  - ▣ Momentum and reversal result from flows between investment funds.
  - ▣ Fund managers and investors are rational.

# Basic Intuition



Suppose that a negative shock hits an asset's fundamentals.

- Funds holding asset realize poor returns.
- Funds experience outflows.
- Funds sell asset.
- If outflows are gradual, asset price declines gradually → **Momentum**.
- Asset price below fundamental value → **Reversal**.

# A Case Study: The Tech Bubble



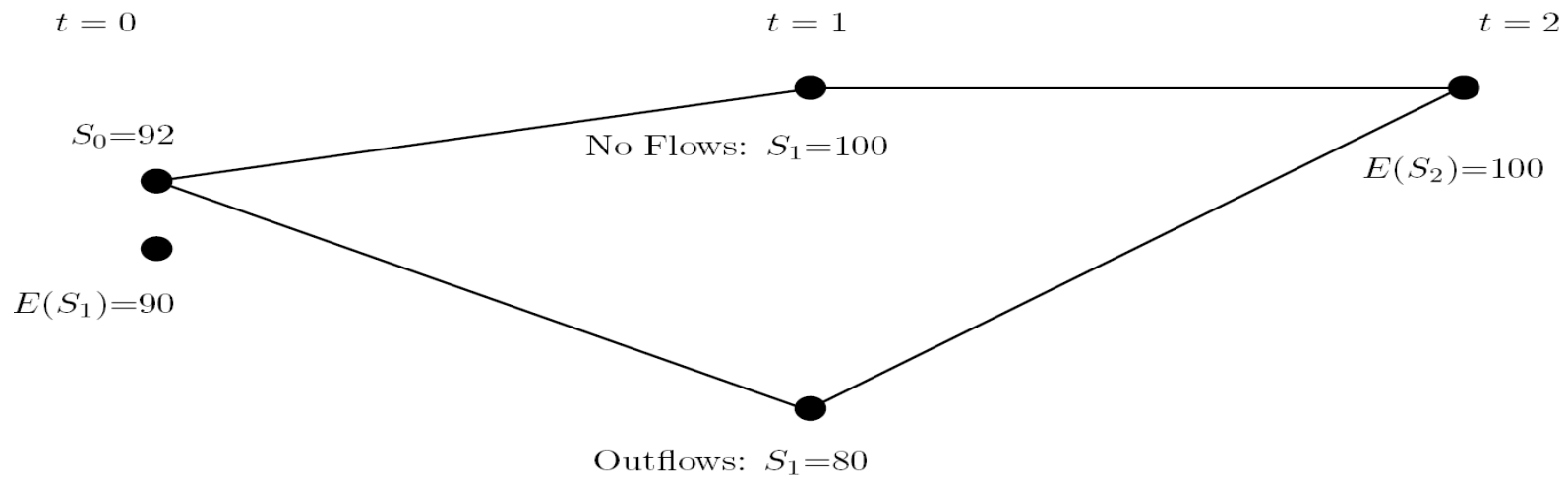
Value was doing OK, but growth much better.

- Outflows from value funds into growth funds.
- Gradual decline in value and further rise in growth.

# The Bird-in-the Hand Effect

- Q: Why do investors absorb outflows, buying assets whose price is expected to drop?
  - ▣ Why isn't the effect of gradual flows fully anticipated into current prices?
- A: Investors prefer one bird in the hand.
  - ▣ Expectation of outflows renders assets undervalued.
  - ▣ Buy now: Lock in attractive long-run return. (One bird in the hand)
  - ▣ Buy after outflows occur: Earn higher return on average, but risk that undervaluation disappears. (Two birds in the bush)

# A Simple Example



- Buy now: Expected return = 8
- Buy after outflows occur: Expected return = 20 or 0.

# Supporting Evidence



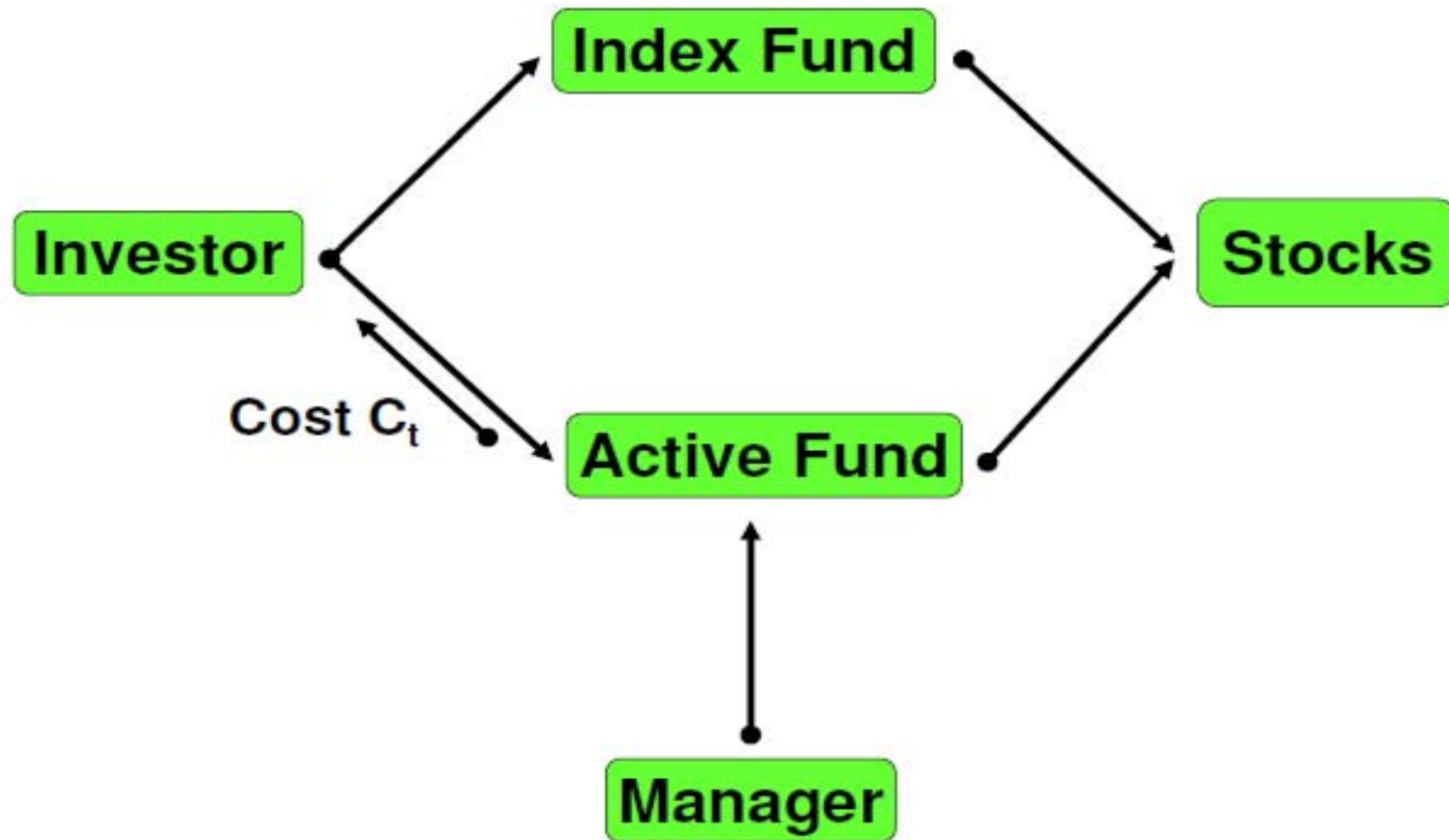
- Lou (2011), A Flow-Based Explanation for Return Predictability.
  - ▣ Predict fund flows based on past returns.
  - ▣ Impute flows in or out of individual stocks.
  - ▣ Use stock-level flows to predict returns.

# Supporting Evidence (cont'd)

<i>Panel B: Subsamples Based on Time Periods and Firm Size</i>								
	Dependent Variable = $\text{ret}(t+1, t+3)$							
	k=6 (80-93)		k=6 (94-06)		k=6 (Small Cap)		k=6 (Large Cap)	
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Intercept	0.072 (1.37)	0.065 (1.29)	<b>0.119</b> (2.54)	0.090 (1.65)	<b>0.653</b> (5.53)	<b>0.631</b> (5.16)	<b>0.223</b> (5.84)	<b>0.190</b> (4.28)
E[FIPP(t-k, t)]		0.106 (1.80)		<b>0.203</b> (3.44)		<b>0.158</b> (3.50)		<b>0.175</b> (3.35)
ret(t)	-0.022 (-1.10)	-0.027 (-1.43)	-0.022 (-1.07)	-0.029 (-1.60)	-0.012 (-0.85)	-0.018 (-1.39)	-0.031 (-1.55)	<b>-0.041</b> (-2.36)
ret(t-k, t-1)	<b>0.032</b> (2.77)	<b>0.027</b> (2.75)	<b>0.023</b> (2.44)	0.014 (1.92)	<b>0.035</b> (4.82)	<b>0.028</b> (4.62)	<b>0.021</b> (3.10)	0.011 (1.57)
ret(t-36, t-k-1)	-0.003 (-1.83)	-0.003 (-1.83)	<b>-0.006</b> (-4.13)	<b>-0.006</b> (-4.11)	<b>-0.005</b> (-2.41)	<b>-0.004</b> (-2.27)	-0.003 (-1.68)	-0.003 (-1.62)
R <sup>2</sup>	7.76%	8.44%	5.69%	6.99%	6.78%	7.55%	8.81%	9.96%
No Obs	72946	72946	150322	150322	104970	104970	118298	118298

- Fund flows explain a good part of stock-level momentum, especially for large stocks and recent data.

# Model





# Dynamics



Following poor returns by active fund:

- Gradual outflows from active fund.
- Stocks that active fund overweights:
  - ▣ Immediate price drop.
  - ▣ Drop in expected return in short run → **Momentum.**
  - ▣ Rise in expected return in long run → **Reversal.**
- Stocks that active fund underweights:
  - ▣ Opposite effects.

# Additional Implications



- Fund flows generate **comovement**.
  - ▣ Following outflows from some funds, all assets held by the funds drop in price.
  - ▣ Supporting evidence: Anton and Polk (2011), Greenwood and Thesmar (2011).
- Fund flows generate **lead-lag effects** (i.e., cross-asset predictability).
  - ▣ Price drop of one asset predicts that other assets held by the same funds will drop in the short run and rise in the long-run.

# Additional Implications (cont'd)



- Momentum, reversal and comovement are larger for assets with high **idiosyncratic risk**.
  - ▣ Trading against mispricings in those assets subjects fund managers to high risk of underperforming their benchmark.
- Predictability of returns based on earnings:
  - ▣ **Post-earnings drift** (earnings surprises predict short-run return movements in same direction).
  - ▣ **Value** stocks have high expected returns and low **and declining** earnings.

# Portfolio Management



- Momentum, reversal and value:
  - ▣ Well-documented empirically.
  - ▣ Form basis for most active investment strategies.
- However:
  - ▣ Investment strategies are mainly data-driven, without underlying conceptual framework.
- ➔ A theory can add value!

# Some Investment Questions



- How to best implement momentum and value?
  - ▣ Raw vs. risk-adjusted returns.
  - ▣ Measure of fundamentals.
- How to best combine momentum and value?
- How does optimal strategy depend on investor's horizon?

# Back to the Theory



- Our theory provides a framework to answer those questions.
- Vayanos and Woolley (2011), A Theoretical Analysis of Momentum and Value Strategies.
  - ▣ Calibration of the model.
  - ▣ Use model as “test bed” to evaluate a number of investment strategies.
  - ▣ Analytical formulas for Sharpe ratios (SR).

# Calibration and SR



- Calibrate using evidence on mutual-fund returns and flows.
  - ▣ Key parameters:
    - Response of flows to performance.
    - Price impact of flows.
- Two types of SR:
  - ▣ Static (short-horizon investor).
    - Standard in empirical studies.
  - ▣ Dynamic (long-horizon investor).

# Construction of Momentum and Value



- Momentum:

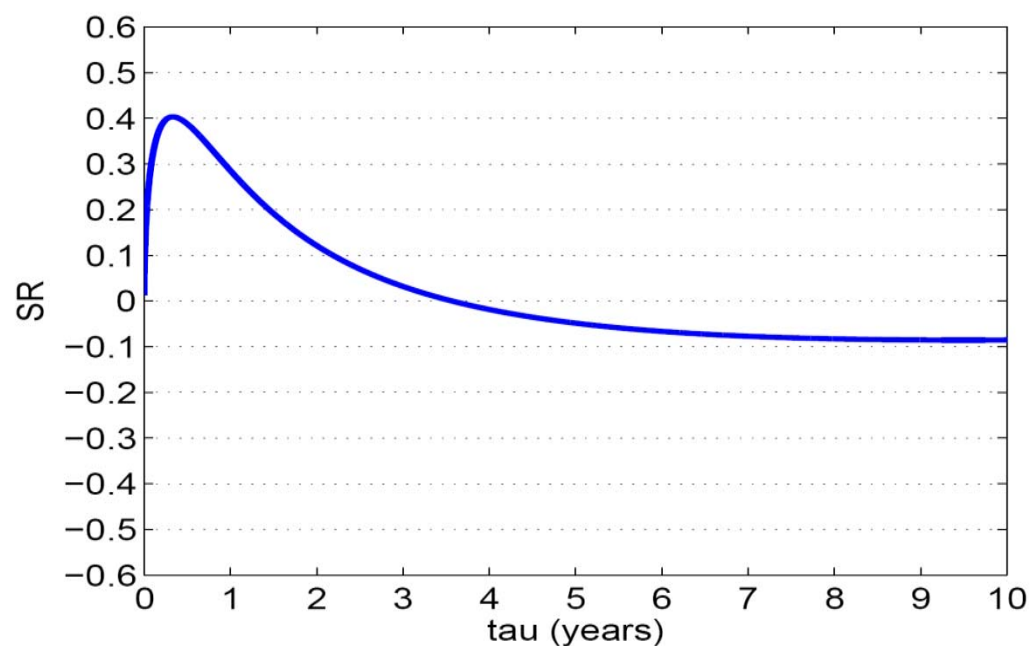
- ▣ High weight for assets with high cumulative returns over a lookback window.

- Value:

- ▣ High weight for assets with high future earnings forecasts relative to price.



# Static SR of Momentum



- Maximum SR = 40%, for lookback window of 4 months.
- For comparison: Market index has SR = 30%.

# Static SR of Value

- Two versions of a value strategy, using different forecasts for future earnings.
  - ▣ Accurate vs. crude forecast.
- Both achieve  $SR = 26\%$ .
  - ▣ Crude forecast does not hurt!
    - Forecast error raises weight of assets for which market expects low earnings.
    - Declining earnings are associated with high expected returns.

# Comments



- SRs somewhat lower than empirical evidence (e.g., AMP 2009).
  - ▣ Momentum: 40% vs 70%/34%.
  - ▣ Value: 26% vs 36%/34%.
  - ▣ Calibration considers only subset of flows.
- Momentum dominates value.
  - ▣ Consistent with empirical evidence.
- Value less sensitive to implementation than momentum.

# Combining Momentum and Value

- Negative correlation between momentum and value.
  - ▣ Consistent with empirical evidence.
- ➔ Diversification benefits from combining the two strategies.
  - ▣ SR of optimal combination = 48%.
- Optimal combination can be further improved!
  - ▣ Overall optimal SR = 61%.
  - ▣ Use information on fund flows.

# Lagged Value



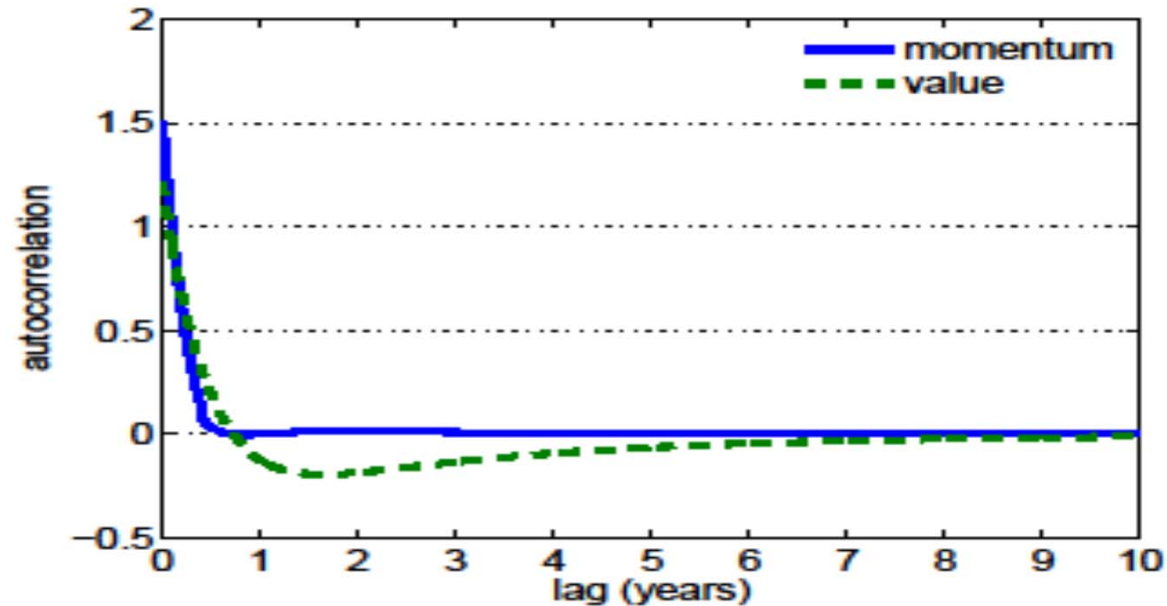
- Value strategy using lagged signal.
- Higher SR than with current signal:
  - ▣ Maximum for 1 year, and equal to 35%.
- Has element of momentum.
- When combined with momentum, SR same as with current signal.

# Dynamic SR



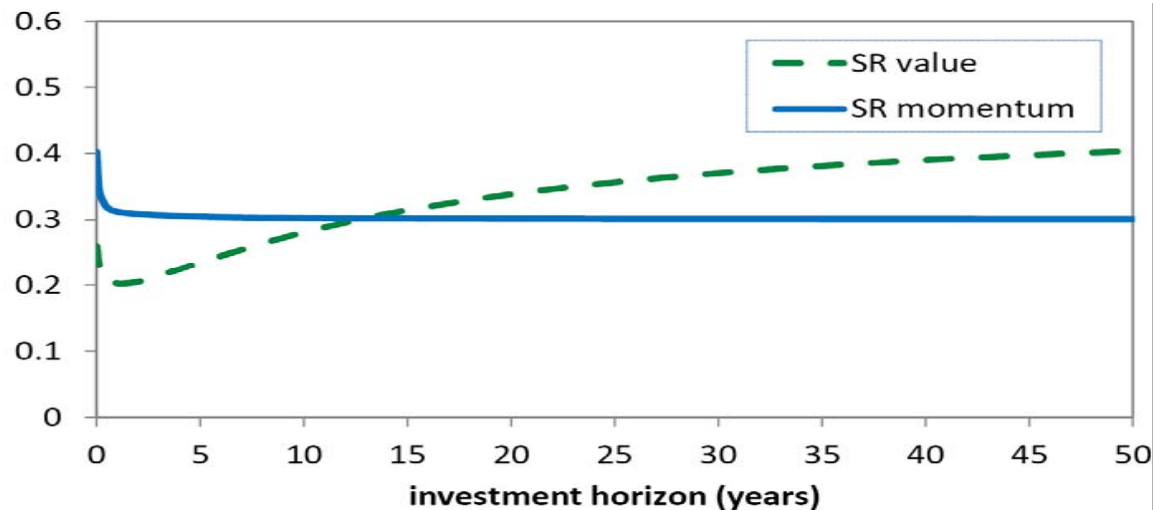
- Exceeds static SR if autocovariance of returns is negative.
  - ▣ Long-run risk is smaller than sum of short-run risks.
- What is autocovariance for momentum and value strategies?

# Autocovariance



- Momentum has small short-run momentum.
  - ▣ Weights change rapidly → Inherit only part of asset return momentum.
- Value has short-run momentum and long-run reversal.
  - ▣ Weights change slowly → Inherit both momentum and reversal.

# Dynamic SR



- Long-run risk of momentum is sum of short-run risks.
  - ▣ Series of uncorrelated bets.
- Long-run risk of value is smaller than sum of short-run risks.
  - ▣ Expected return becomes higher following poor performance.
- Value overtakes momentum for long investment horizons.



# Conclusion



- Momentum, reversal and value can result from flows between investment funds.
- Analytical framework for studying efficient portfolio management in an inefficient market.
  - Good to combine momentum and value. Even better to use information on fund flows.
  - Long-run investors should raise their weight on value and lower that on momentum.

# Further Reading

## □ Papers:

- Vayanos-Woolley (VW 2011): An Institutional Theory of Momentum and Reversal.  
<http://personal.lse.ac.uk/vayanos/WPapers/ITMR.pdf>
- VW (2011): A Theoretical Analysis of Momentum and Value Strategies.  
<http://personal.lse.ac.uk/vayanos/WPapers/TAMVS.pdf>

## □ VoxEU Columns:

- VW (2009): Capital Market Theory after the Efficient Market Hypothesis.  
<http://www.voxeu.org/index.php?q=node/4052>
- VW (2012): New Light in the Choice of Investment Strategy.  
<http://www.voxeu.org/index.php?q=node/7530>