



# Factor Investing on Industries

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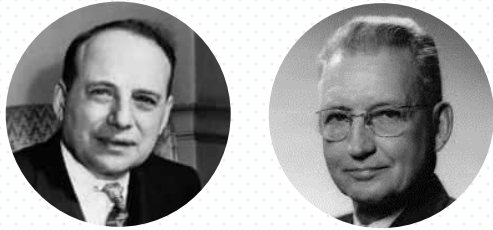
EVIDENCE FROM THE CHINA A-SHARES MARKET

# Traditional Risk Factors

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## Value



1934

***HML***

high minus low

Long cheap  
Short expensive

$P/B, P/E, P/S$

## Low Volatility



1972

***BAB***

betting against beta

Long low volatility  
Short high volatility

$\sigma_p$

## Momentum



1993

***UMD***

up minus down

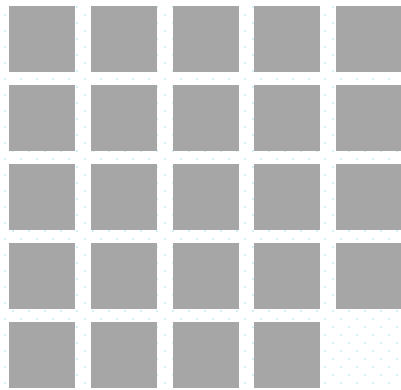
Long past winners  
Short past losers

$P_t/P_{t-n}$

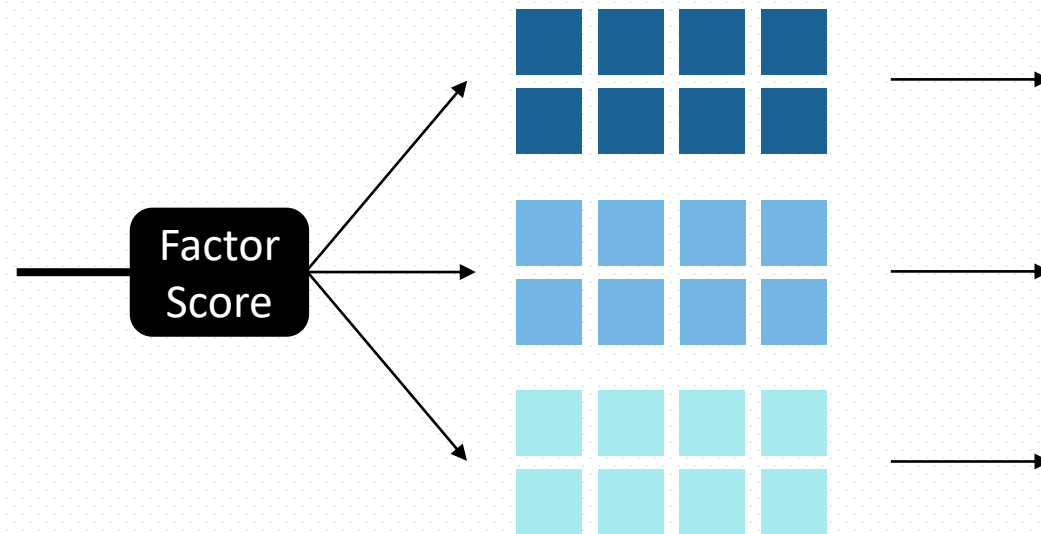
# Portfolio Formation

**Win.d**

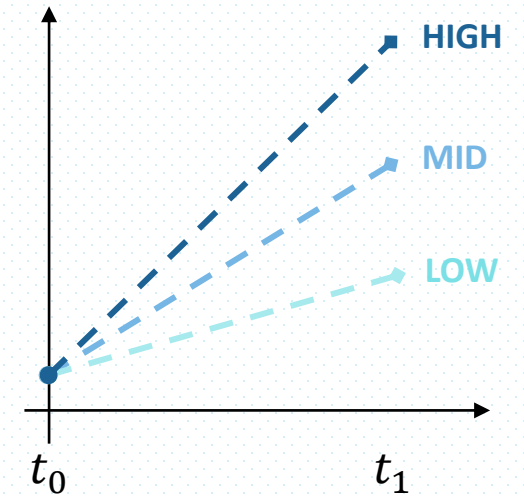
2006/01/01 – 2021/03/31



**24 Industries**



**3 Tertiles**



**Track Performance**

# Rebalancing

**L** = Look-back

**H** = Holding Period

	H = 1M	H = 3M	H = 6M
L = 3M			
L = 6M			
L = 12M			

$HI_{12,1}$

$MD_{12,1}$

$LO_{12,1}$

$HI_{12,3}$

$MD_{12,3}$

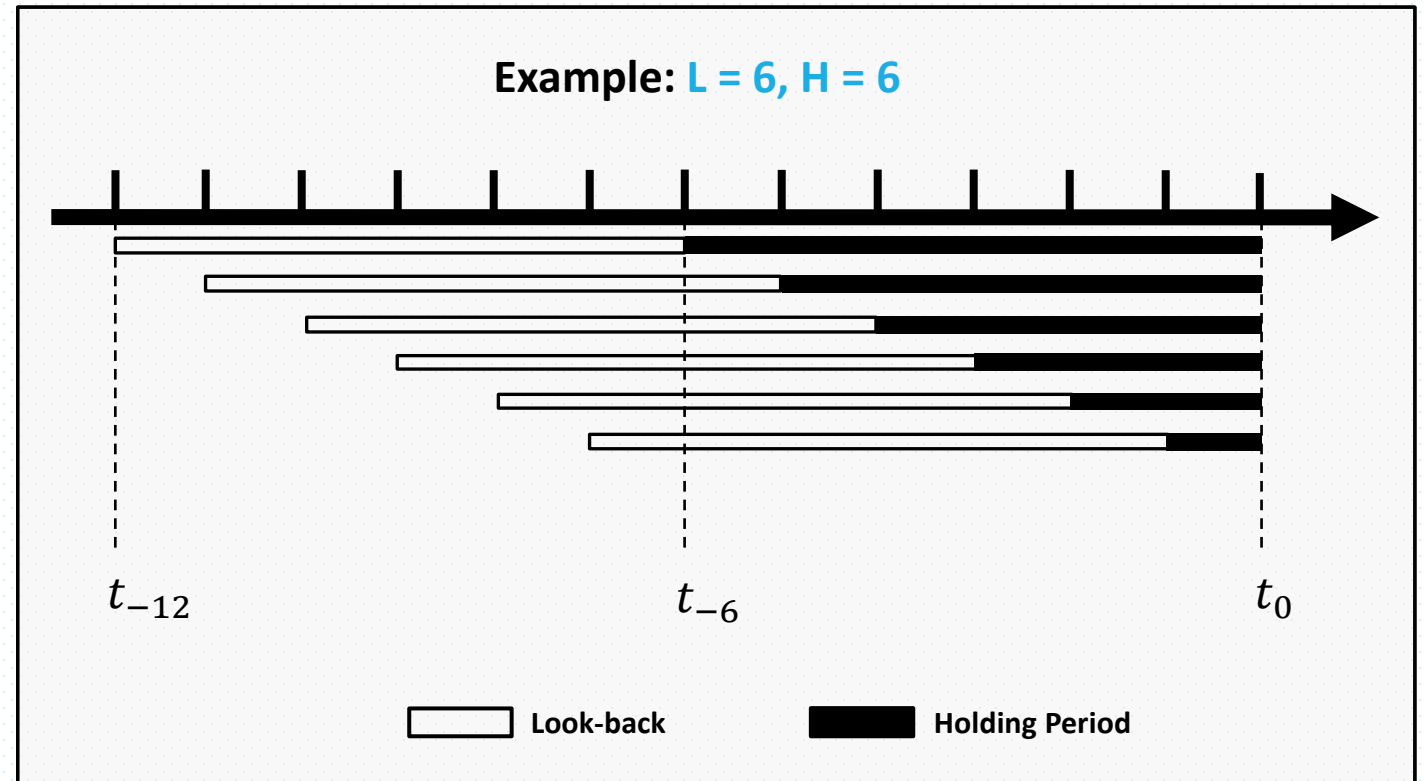
$LO_{12,3}$

$HI_{12,6}$

$MD_{12,6}$

$LO_{12,6}$

Constructing a matrix of different L/H combinations



Forming portfolios with overlapping periods

# Low Volatility

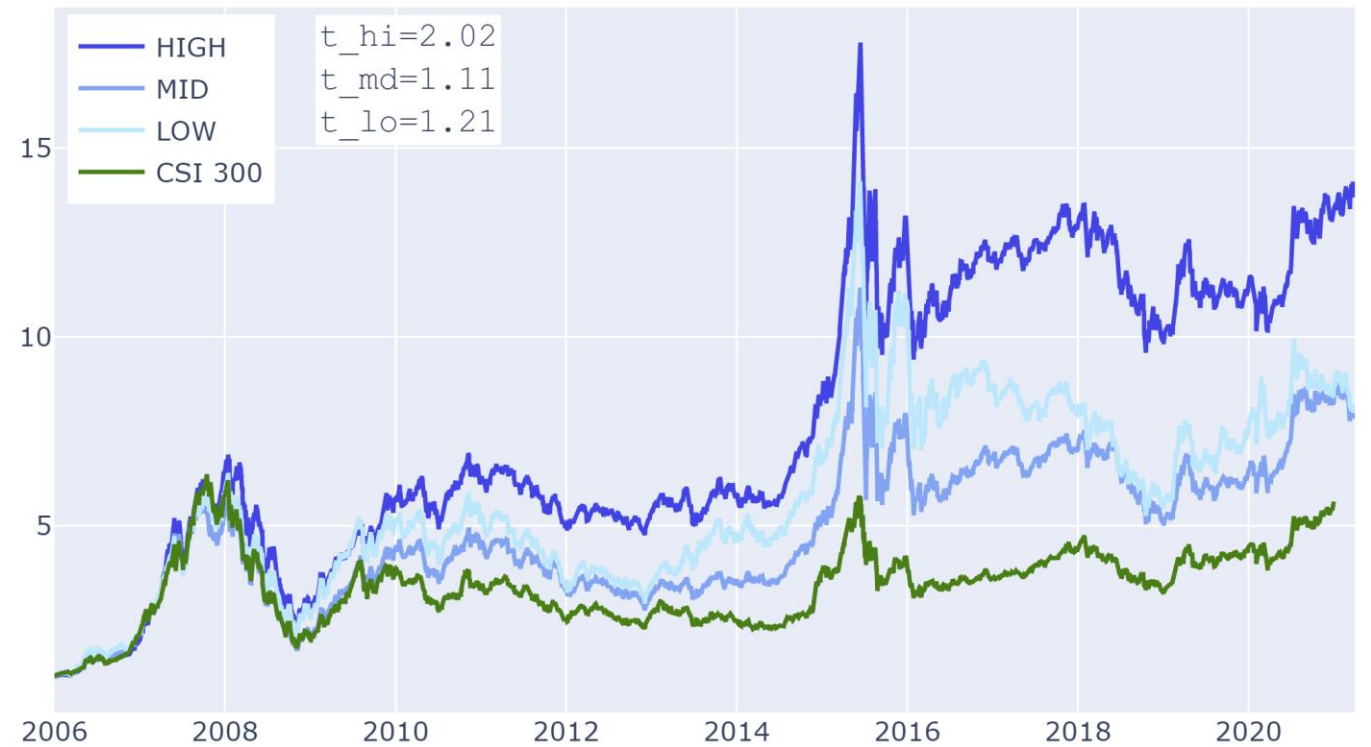
“Las Vegas is busy every day, so we know that not everyone is rational.”  
- Charles D. Ellis

L=1M	0.47	1.07	1.31	1.45	1.51
L=2M	1.11	1.62	1.89	1.56	1.58
L=3M	1.57	2.01	1.95	1.57	1.70
L=6M	1.24	1.56	1.45	1.45	1.80
L=12M	1.62	2.00	2.14	2.15	1.96
L=18M	1.85	2.10	2.07	1.97	1.74
L=24M	1.67	1.90	1.88	1.81	1.62
	H=1M	H=2M	H=3M	H=6M	H=12M

**Top Tertile Significance Level (t-stat)**

L=1M	0.09	0.10	0.11	0.11	0.11
L=2M	0.11	0.11	0.12	0.11	0.11
L=3M	0.12	0.12	0.12	0.11	0.11
L=6M	0.11	0.11	0.11	0.11	0.12
L=12M	0.12	0.12	0.13	0.13	0.12
L=18M	0.12	0.13	0.12	0.12	0.12
L=24M	0.12	0.12	0.12	0.12	0.11
	H=1M	H=2M	H=3M	H=6M	H=12M

**Top Tertile Annualized Return**



**Performance of [L=12M, H=3M] Portfolio**

Annualized Return	Annualized Excess	Volatility
12.58%	4.65%	21.85%
Risk-Adjusted Return	Max Drawdown	Tracking Error
0.58	66.29%	11.18%

# Value

“Short-term and long-term results typically lead to different results,  
which are often the opposite.” – Eben Pagan



*“The average value of earnings for each security is obtained from the previous 3 reported fiscal year-end earnings values.”*

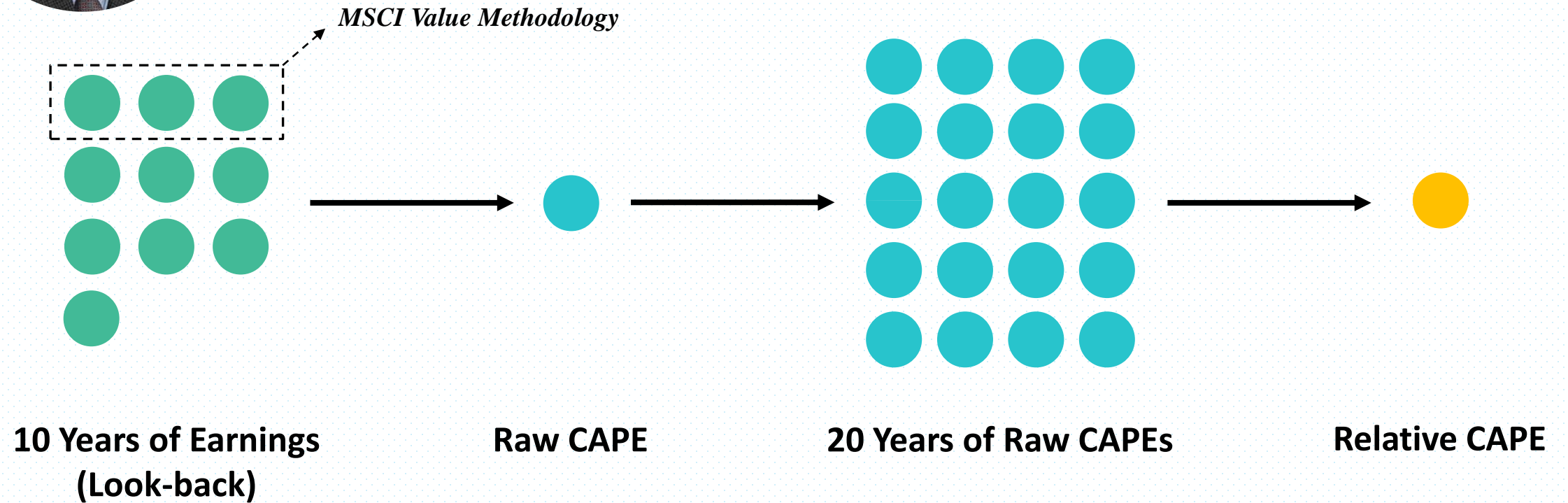
– MSCI Value Weighted Index Methodology Section 2.3.3

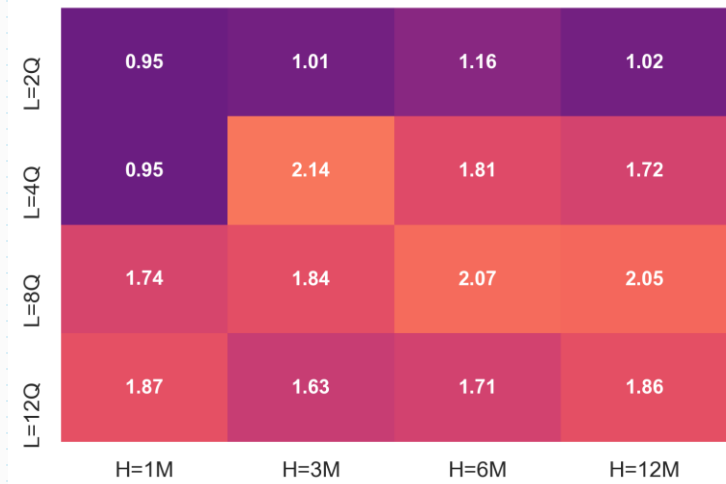


Performance of [L=12Q, H=6M] Portfolio

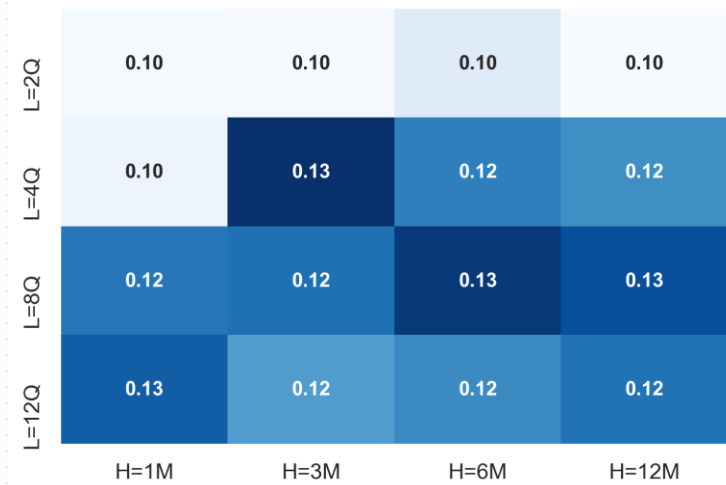


# Cyclically Adjusted Price-Earnings Ratio

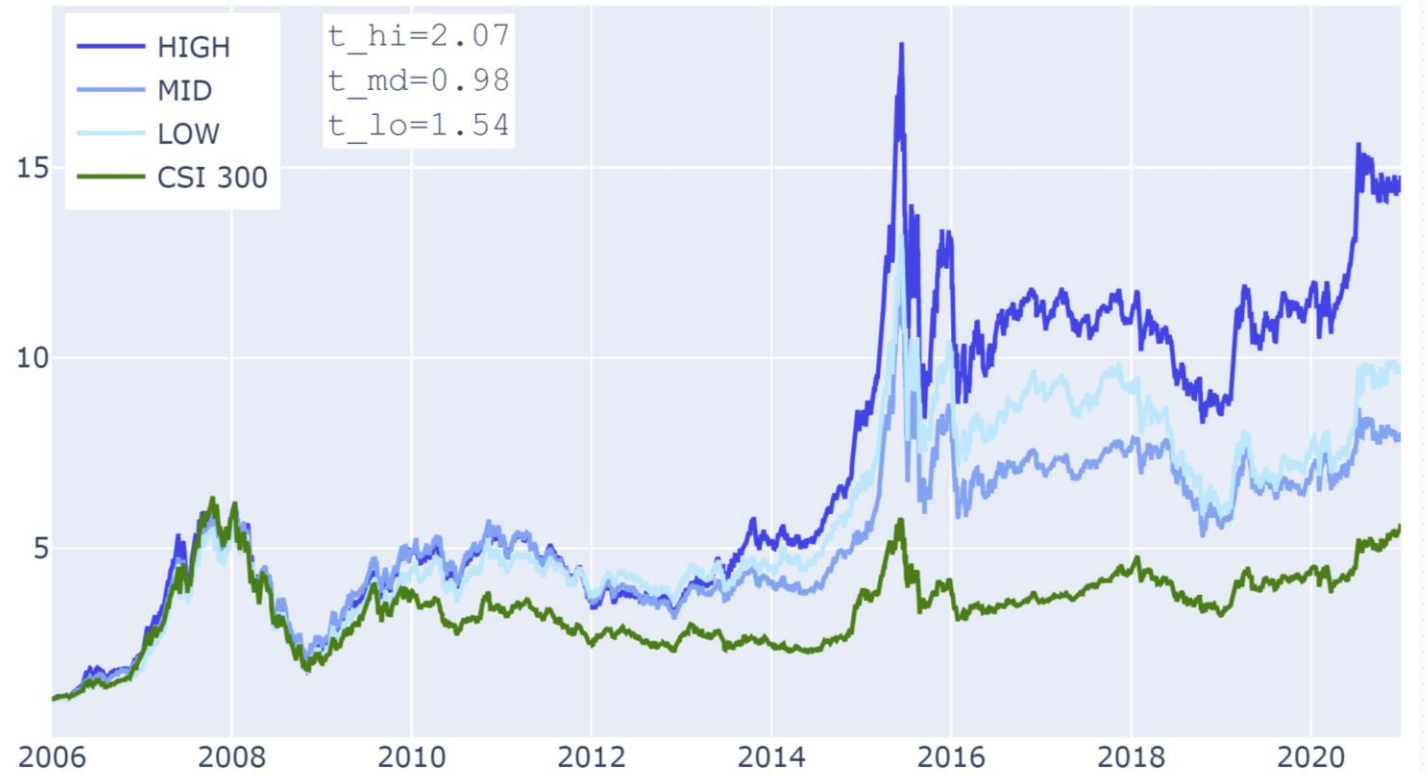




**Top Tertile Significance Level (t-stat)**



**Top Tertile Annualized Return**



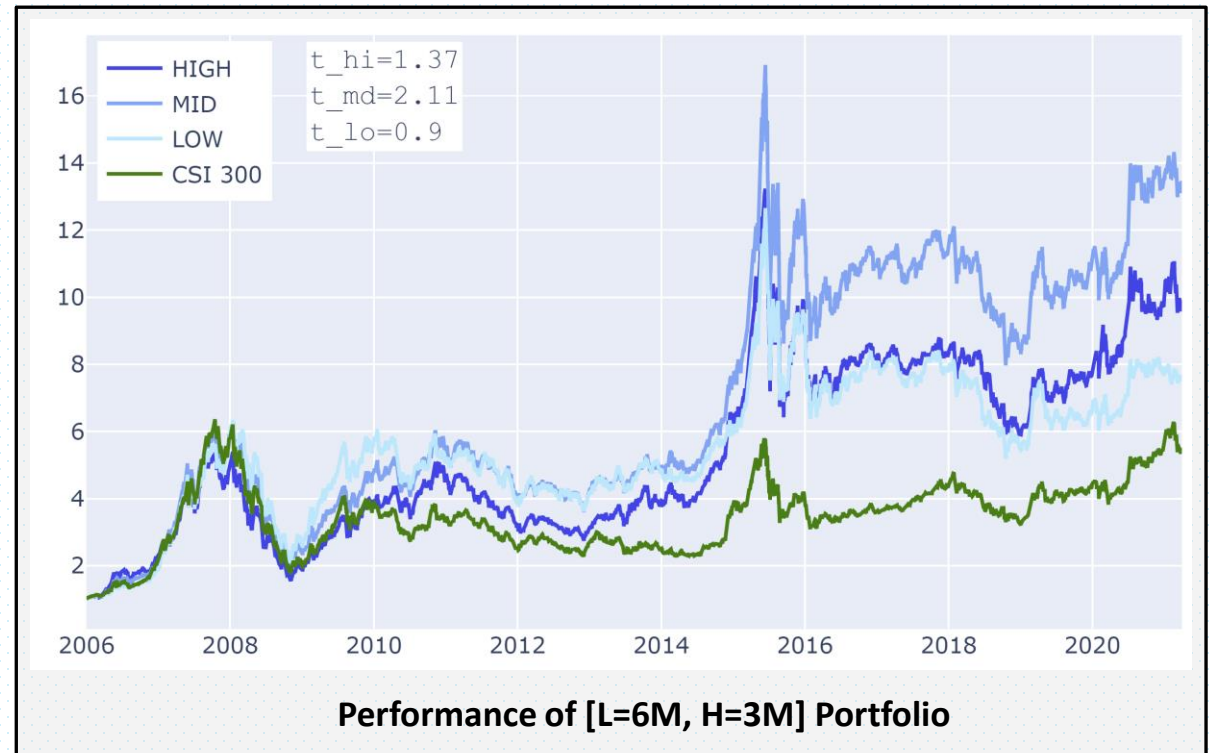
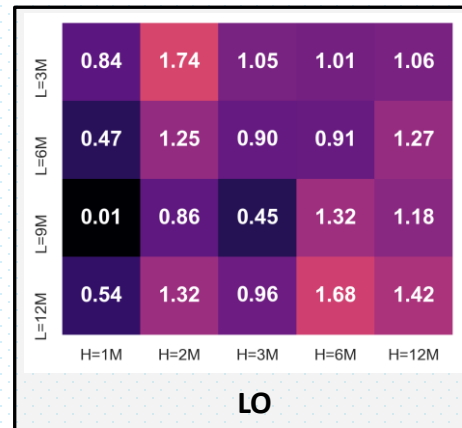
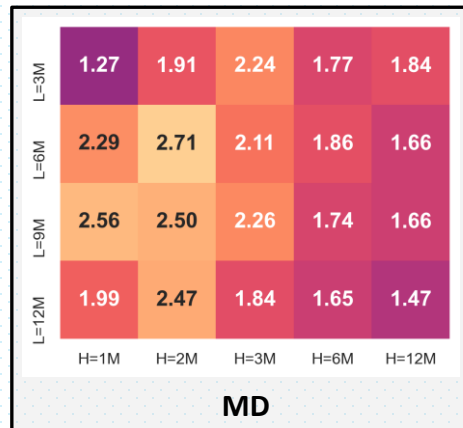
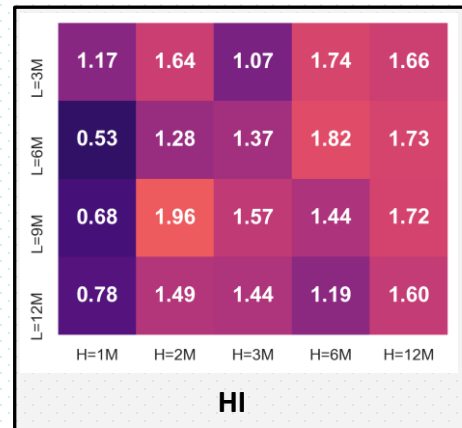
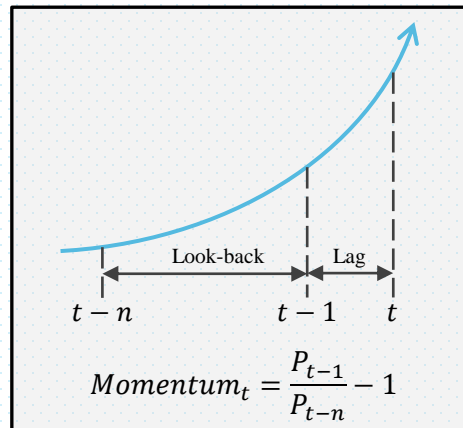
**Performance of [L=8Q, H=6M] Portfolio**

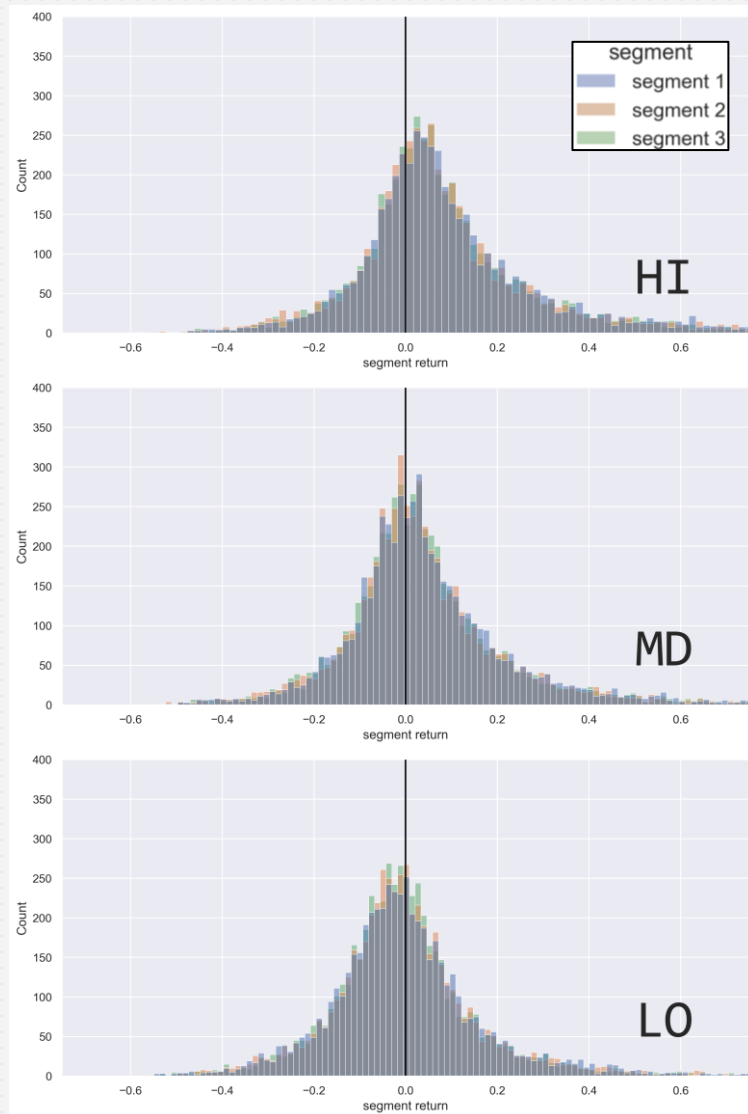
Annualized Return	Annualized Excess	Volatility
13.08%	4.86%	24.73%
Risk-Adjusted Return	Max Drawdown	Tracking Error
0.53	71.61%	13.82%

# Momentum

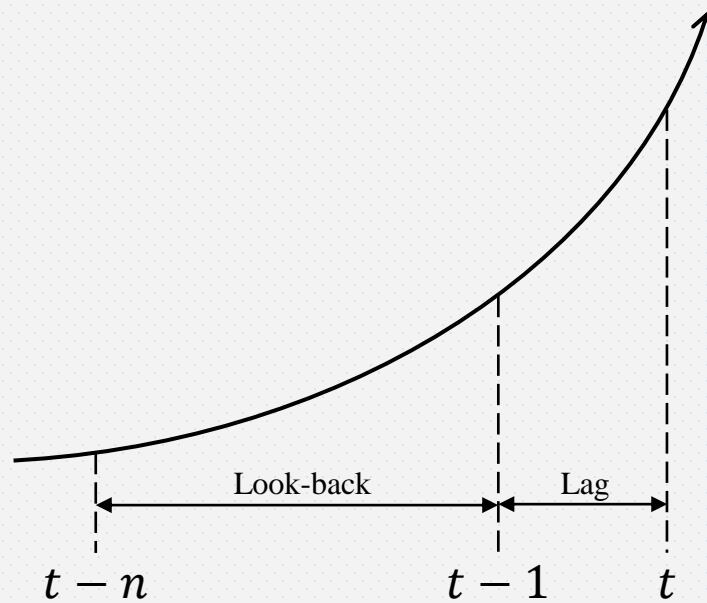
“The trend is your friend.”  
– Martin Zweig

# Traditional Momentum – When Second Place Wins



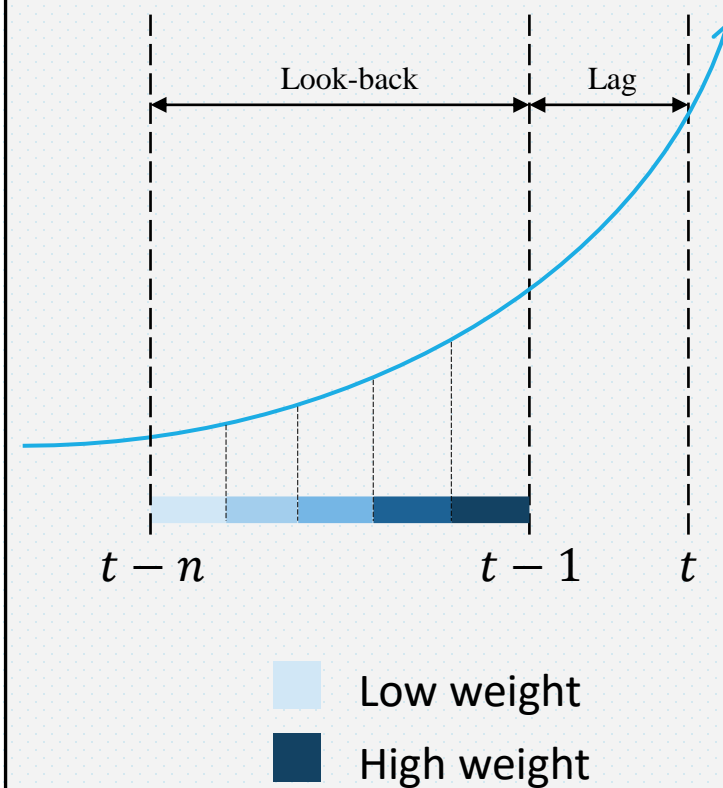


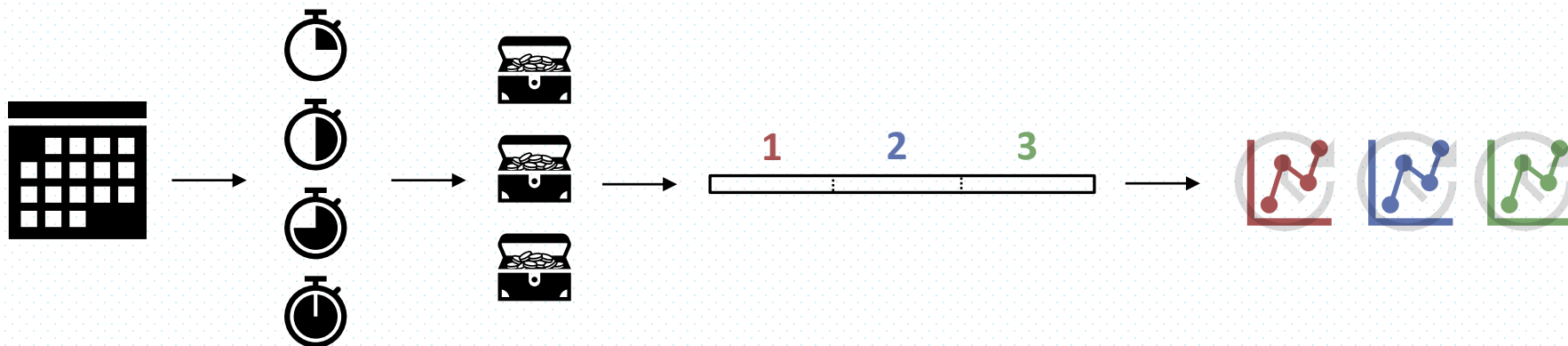
## Traditional



$$Momentum_t = \frac{P_{t-1}}{P_{t-n}} - 1$$

## Time-weighted





**Example: 2021.08.01**

**L = 1Q**

**Mid Portfolio**

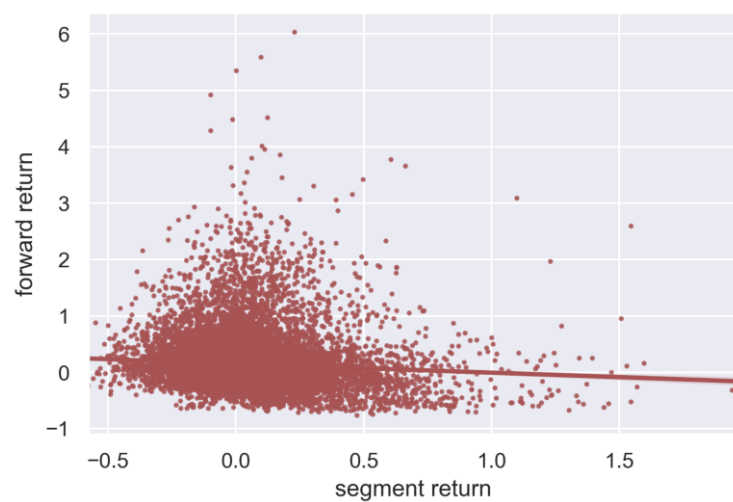
**Segment 1, 2, 3**

**Regression to fit Forward Returns**

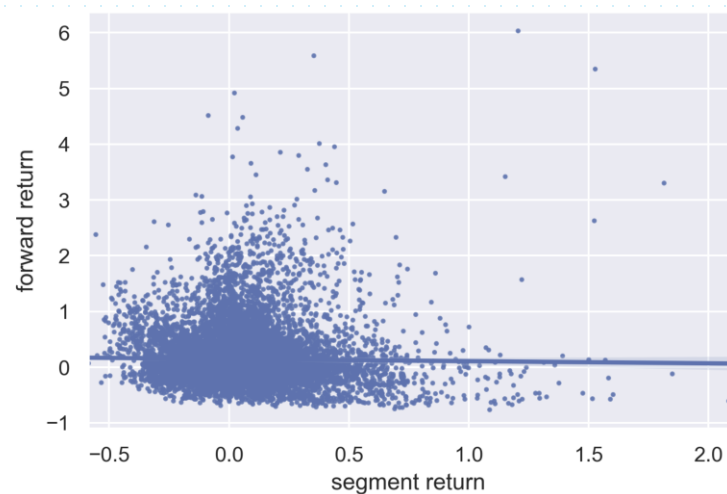
(2021.04.01 - 2021.06.30)

(2021.04.01 - 2021.04.30,  
2021.05.01 - 2021.05.31,  
2021.06.01 - 2021.06.30)

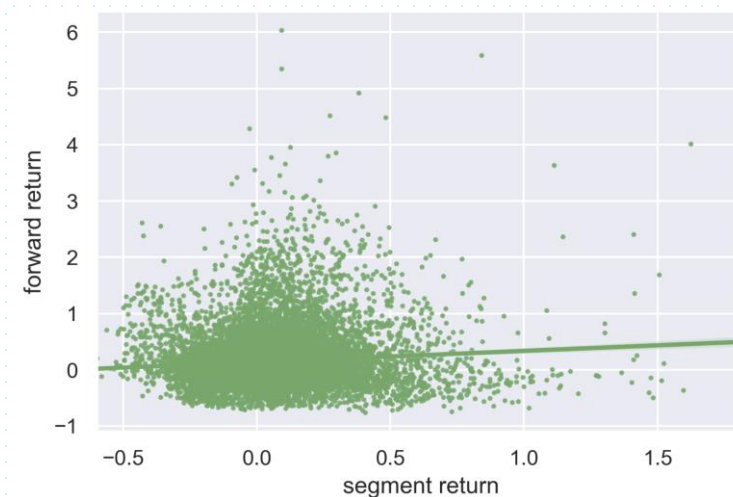
(2021.11.30)



**Segment 1 (Oldest)**



**Segment 2**



**Segment 3 (Most Recent)**

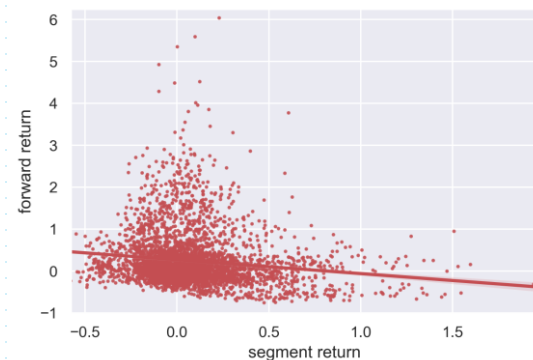
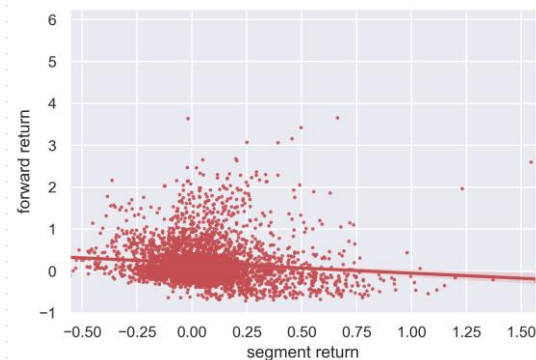
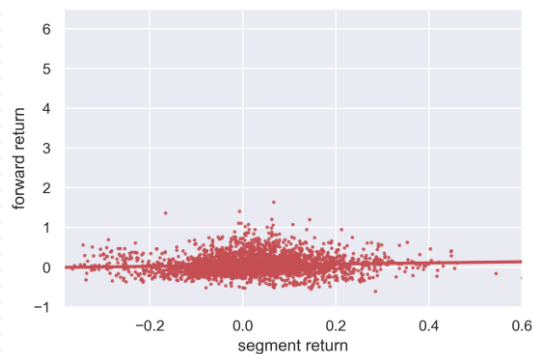
 **L = 3M**

 **L = 6M**

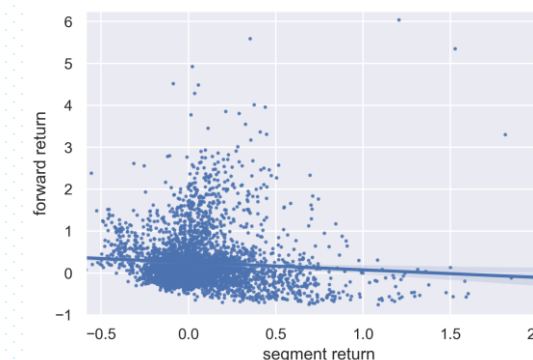
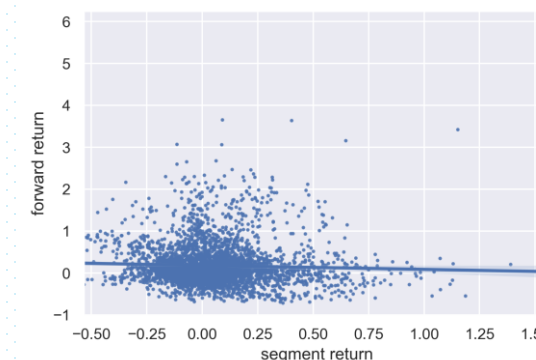
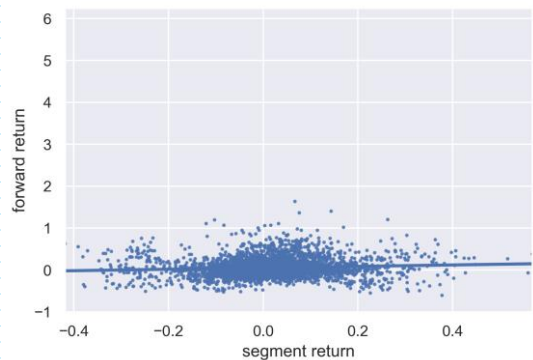
 **L = 9M**

 **L = 12M**

**SEG. 1**



**SEG. 2**



**SEG. 3**

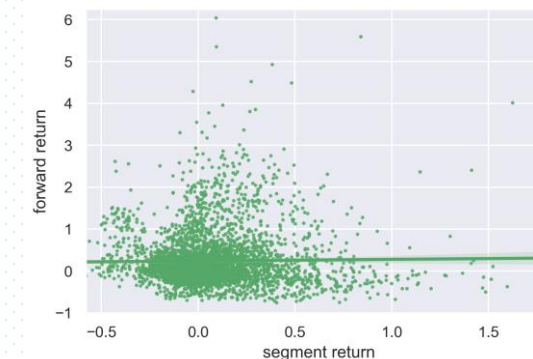
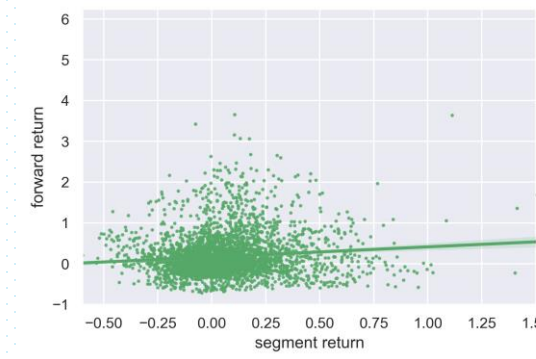
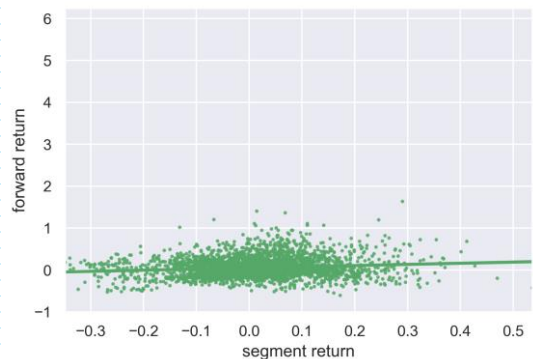
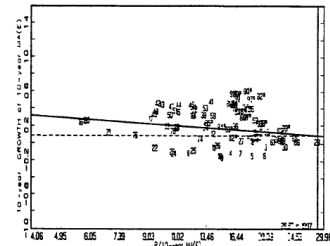


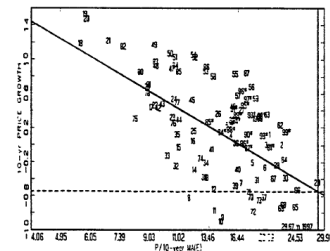


EXHIBIT 6  
SMOOTHED TEN-YEAR GROWTH MEASURES

PANEL A. TEN-YEAR GROWTH OF TEN-YEAR MA(E) VERSUS P/TEN-YEAR MA(E)



PANEL B. TEN-YEAR PRICE GROWTH VERSUS P/TEN-YEAR MA(E)



given way to services as the economy's leading sector. Automobiles and airplanes have revolutionized transport, while radio, television, and now the Internet have transformed communication. Massive corporations emerged to exploit the economies of mass production, but these are now being replaced by smaller, more flexible organizations that can exploit information technology more effectively.

These changes have affected the financial sector just as deeply as any other part of the economy. Yet cer-

tain aspects of financial market behavior have remained remarkably stable throughout the tumult of the twentieth century. We have seen that stock market valuation ratios have moved up and down within a fairly well-defined range, without strong trends or sudden breaks.

Despite the historical stability of valuation ratios, some market observers question whether historical patterns offer a reliable guide to the future. Various arguments are put forward to justify the notion that financial markets are entering a "new era." Some of these arguments have to do with corporate financial policy, while others concern investor behavior or the structure of the U.S. economy.

#### FINANCIAL MARKET CHANGES

##### Repurchases and the Dividend-Price Ratio

Dividends represent cash paid to ongoing shareholders, and this makes dividends an appealing indicator of fundamental value. In fact, over very long holding periods, the return to shareholders is dominated by dividends, because the end-of-holding-period stock price becomes trivially small when it is discounted from the end to the beginning of a long holding period.

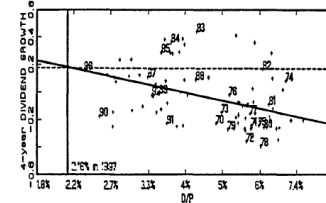
Nonetheless, an important criticism of the dividend-price ratio is that it can be affected by corporate financial policy. Companies can repurchase their stock, for instance, as a tax-favored alternative to paying dividends. Repurchases transfer cash to the shareholders who sell their stock, and benefit ongoing shareholders because future dividend payments will be divided among fewer shares.

If a corporation permanently diverts funds from dividends to a repurchase program, it reduces current dividends but begins an ongoing reduction in the number of shares and thus increases the long-run growth rate of dividends per share. This in turn can permanently lower the dividend-price ratio, driving it outside its normal historical range. Many commentators have argued that repurchases, not excessive stock prices, are responsible for the record low dividend-price ratio in 1997.

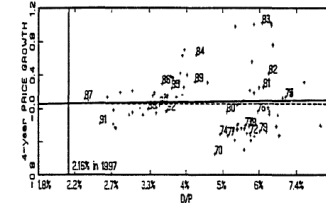
One way to correct the dividend-price ratio for shifts in corporate financial policy is to add net repurchases (dollars spent on repurchases less dollars received from new issues) to dividends. Cole, Helwege, and Laster [1996] do this for S&P 500 firms over the period

EXHIBIT 7  
CONTINUED

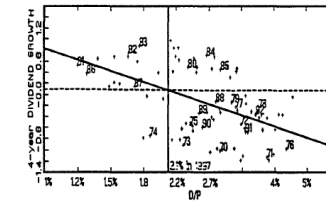
GERMANY — DIVIDEND GROWTH VERSUS D/P



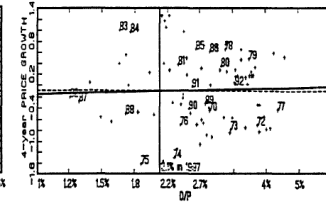
PRICE GROWTH VERSUS D/P



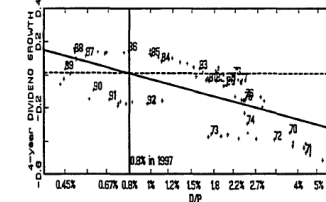
ITALY — DIVIDEND GROWTH VERSUS D/P



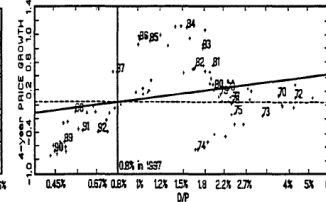
PRICE GROWTH VERSUS D/P



JAPAN — DIVIDEND GROWTH VERSUS D/P



PRICE GROWTH VERSUS D/P



We perform a simple Monte Carlo experiment to study this issue. We construct artificial data in which the dividend-price ratio does not forecast future price changes over any fixed horizon. In other words, we generate data that satisfy the efficient markets prediction that the real stock price is a random walk.<sup>12</sup> Also,

we generate the data to match several important characteristics of the actual annual U.S. data.

We begin by estimating a first-order autoregressive [AR(1)] model for the log dividend-price ratio using our 125 observations for the period 1872 to 1997. We correct the regression coefficient for small-

## Valuation Ratios and the Long-Run Stock Market Outlook

— John Campbell, Robert Shiller (1998)

# Holt-Linear (Exponential Smoothing)

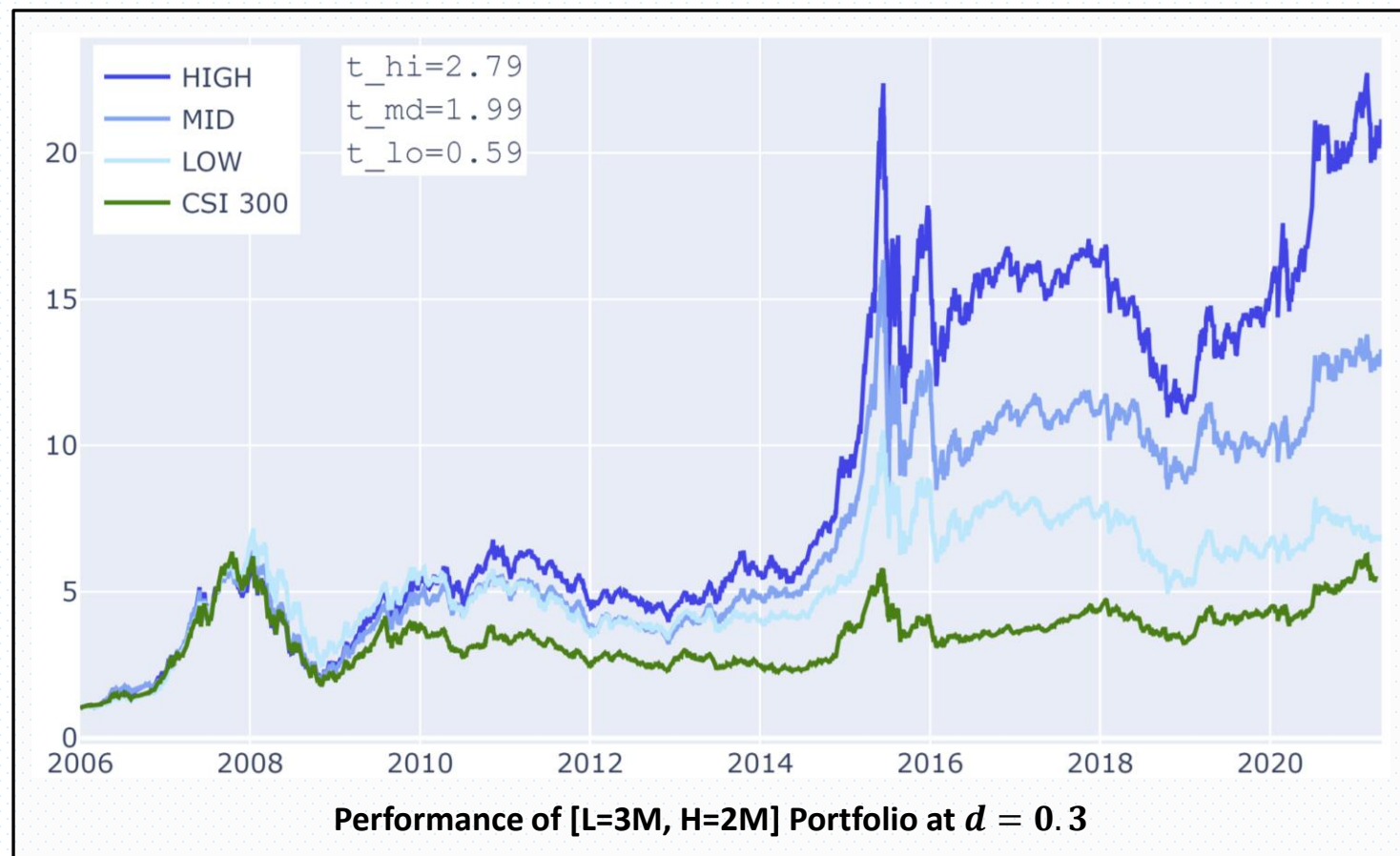
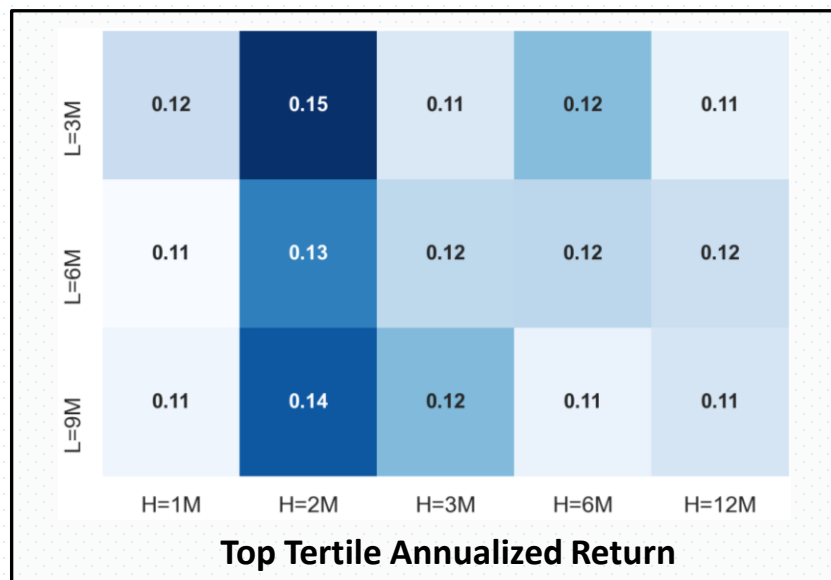
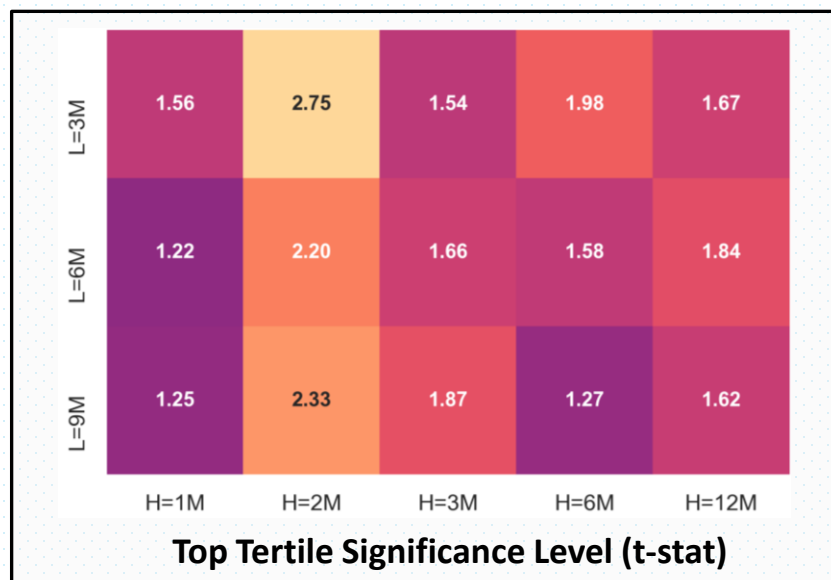
$$\begin{cases} s_0 = x_0 \\ s_t = d \cdot x_t + (1 - d) \cdot x_{t-1} \end{cases}$$

↑  
Decay Factor

At  $d = 1$ , the smoothed series becomes the original series.  
(traditional momentum)

**Example ( $d = 0.5$ )**

t	Original	Smoothed
$t_0$	100	100
$t_1$	120	$100 * 0.5 + 120 * 0.5 = 110$
$t_2$	150	$110 * 0.5 + 150 * 0.5 = 120$
$t_3$	160	$120 * 0.5 + 160 * 0.5 = 140$
$t_4$	140	$140 * 0.5 + 140 * 0.5 = 140$
$t_5$	200	$140 * 0.5 + 200 * 0.5 = 170$





Annualized Return	Annualized Excess	Volatility
14.49%	6.56%	24.54%
Risk-Adjusted Return	Max Drawdown	Tracking Error
0.59	68.32%	13.52%

# Multi-Factor

My philosophy? Simplicity plus variety.  
– Hank Stram

# Composite Index Construction

	cape_raw	lovo_raw	holt_raw	cape_rank	lovo_rank	holt_rank	avg_rank	cape_z	lovo_z	holt_z	avg_z
Banks	1.529	6.780	0.089	4	2	4	3.333	1.559	1.442	1.116	1.372
Utilities	1.709	7.855	-0.044	3	1	21	8.333	1.691	2.466	-0.930	1.075
Technology	-0.853	4.072	0.177	10	19	1	10.000	-0.191	-1.136	2.452	0.375
Pharmaceut	1.113	5.356	-0.002	5	12	13	10.000	1.254	0.087	-0.286	0.351
Diversifie	2.447	3.448	0.044	1	23	6	10.000	2.233	-1.729	0.414	0.306
Energy	-1.338	6.743	0.014	14	3	8	8.333	-0.547	1.407	-0.042	0.273
Semiconduc	-1.385	3.808	0.156	15	20	2	12.333	-0.581	-1.387	2.126	0.053
Household	-0.133	5.362	-0.006	7	11	16	11.333	0.338	0.092	-0.347	0.028
Real Estat	-1.229	5.348	0.032	13	13	7	11.000	-0.467	0.079	0.235	-0.051
Food, Beve	1.891	5.198	-0.110	2	16	23	13.667	1.825	-0.064	-1.932	-0.057
Retailing	-0.082	5.316	-0.025	6	14	19	13.000	0.376	0.049	-0.632	-0.069
Consumer S	-1.539	5.845	-0.002	17	6	12	11.667	-0.694	0.552	-0.281	-0.141
Communicat	-0.214	3.668	0.068	8	22	5	11.667	0.279	-1.520	0.786	-0.152
Food & Sta	-0.995	6.215	-0.054	11	4	22	12.333	-0.295	0.904	-1.086	-0.159
Capital Go	-1.213	5.420	0.003	12	7	10	9.667	-0.455	0.148	-0.212	-0.173
Transporta	-1.499	6.013	-0.022	16	5	18	13.000	-0.665	0.712	-0.586	-0.180
Automobile	-0.807	5.385	-0.035	9	9	20	12.667	-0.157	0.114	-0.790	-0.278
Consumer D	-1.558	5.394	-0.000	18	8	11	12.333	-0.708	0.123	-0.259	-0.282
Materials	-1.562	5.373	-0.005	19	10	15	14.667	-0.711	0.103	-0.324	-0.311
Software &	-2.086	3.754	0.117	22	21	3	15.333	-1.096	-1.439	1.533	-0.334
Health Car	-2.413	5.294	0.008	23	15	9	15.667	-1.336	0.027	-0.125	-0.478
Commercial	-1.687	4.843	-0.018	20	17	17	18.000	-0.803	-0.402	-0.533	-0.579
Media	-1.745	4.606	-0.003	21	18	14	17.667	-0.846	-0.627	-0.296	-0.589

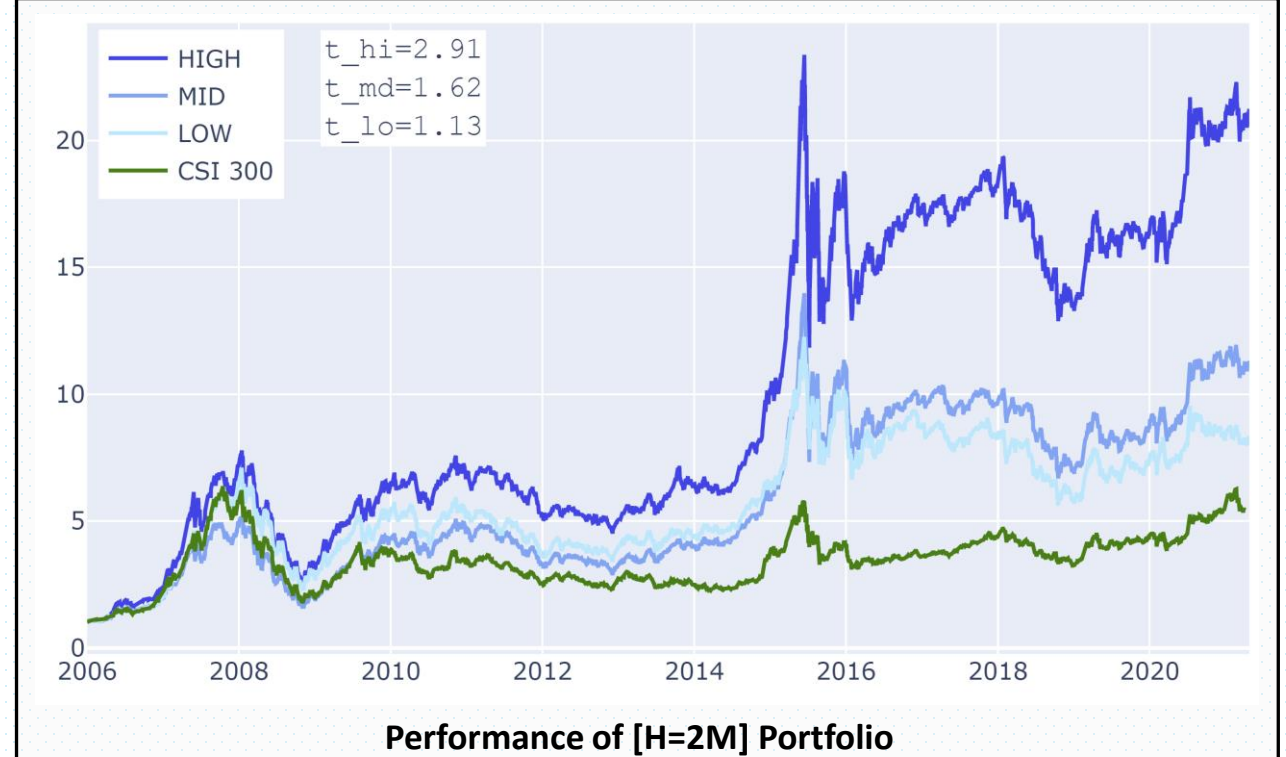
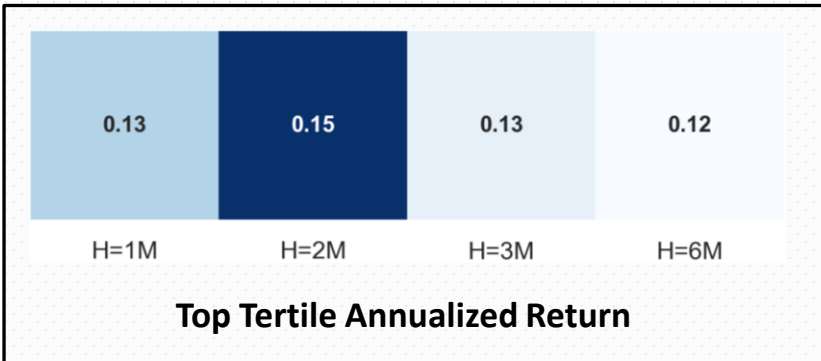
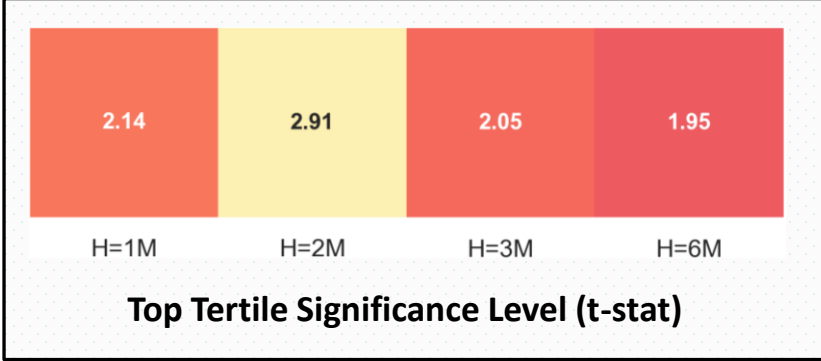
**24 Industries**

**Raw Scores**

**Raw Score Rankings**

**Z-Score Rankings**

Capped within [-3, 3]



	Ann. Return	Ann. Excess	Volatility	Risk-Adj. Return	Max Drawdown	Tracking Error
Low Volatility	12.58%	4.65%	21.85%	0.58	66.29%	11.18%
Value (CAPE)	13.08%	4.86%	24.73%	0.53	71.61%	13.82%
Momentum (Holt)	14.49%	6.56%	24.54%	0.59	68.32%	13.52%
Multi-Factor	14.59%	6.66%	22.98%	0.64	68.12%	12.24%

# The Good, the Bad and the Ugly

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- Significantly more profitable than benchmark
- Better level of diversification than portfolios with idiosyncratic stocks
- Defensive against different market cycles
- Simple yet elegant construction



- Liquidity concerns
- Not ideal over short-term horizons



- Factor impurity (e.g., exposure to size)

# References

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Thanks :)