"Style Concentration in Ownership and Expected Stock Returns"

by

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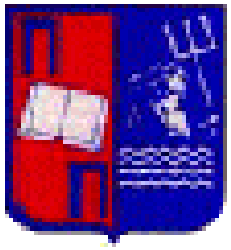

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Style Concentration in Ownership and Expected Stock Returns

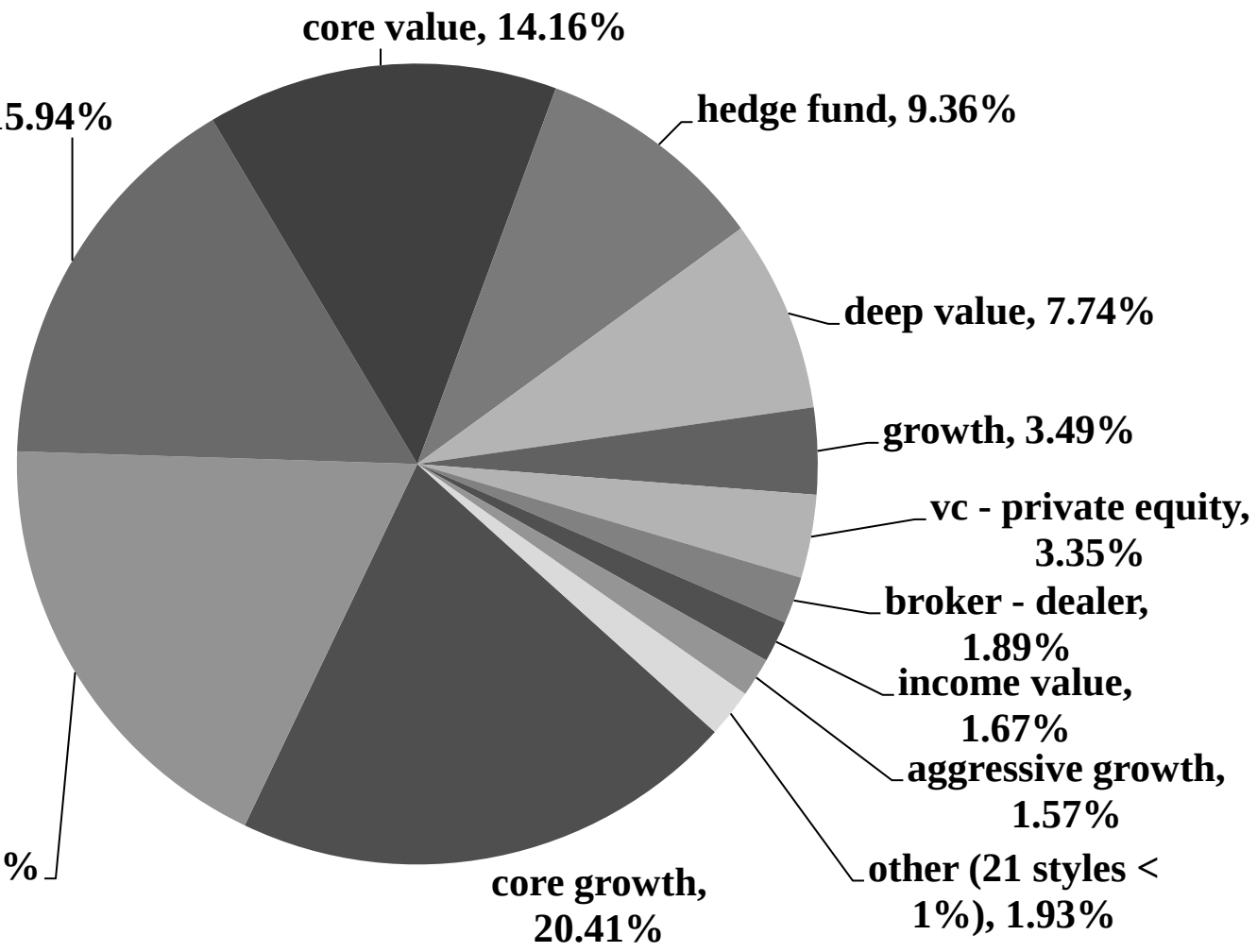
CONTENTS

I. Introduction: Investment styles

- Institutional investors own 80% of the market today and follow Investment styles , defined according to simple quantitative rules based on firm characteristics (mainly size and market-to-book ratio): GROWTH, VALUE, INCOME, INDEX, HEDGE-FUND, VENTURE CAPITAL, etc.
- The literature on style investing accelerated following the behavioral model of Barberis and Shleifer (2003), who predict momentum effects and then reversals, plus increased co-variability within a style
- The literature assigns a stock into a unique style, whereas in reality a stock can be held by different styles
- Thomson Financial provides a data set on 32 styles and their ownership of each stock
- We focus on the dispersion of stock ownership to the different styles, specifically, on style related inattention

I. Introduction: Institutional Ownership by Investment Style

Mean Share of Stock Ownership by Styles



32 styles: Mean % share in stock ownership by investment style among 13F filers from 1997Q1 to 2015Q4

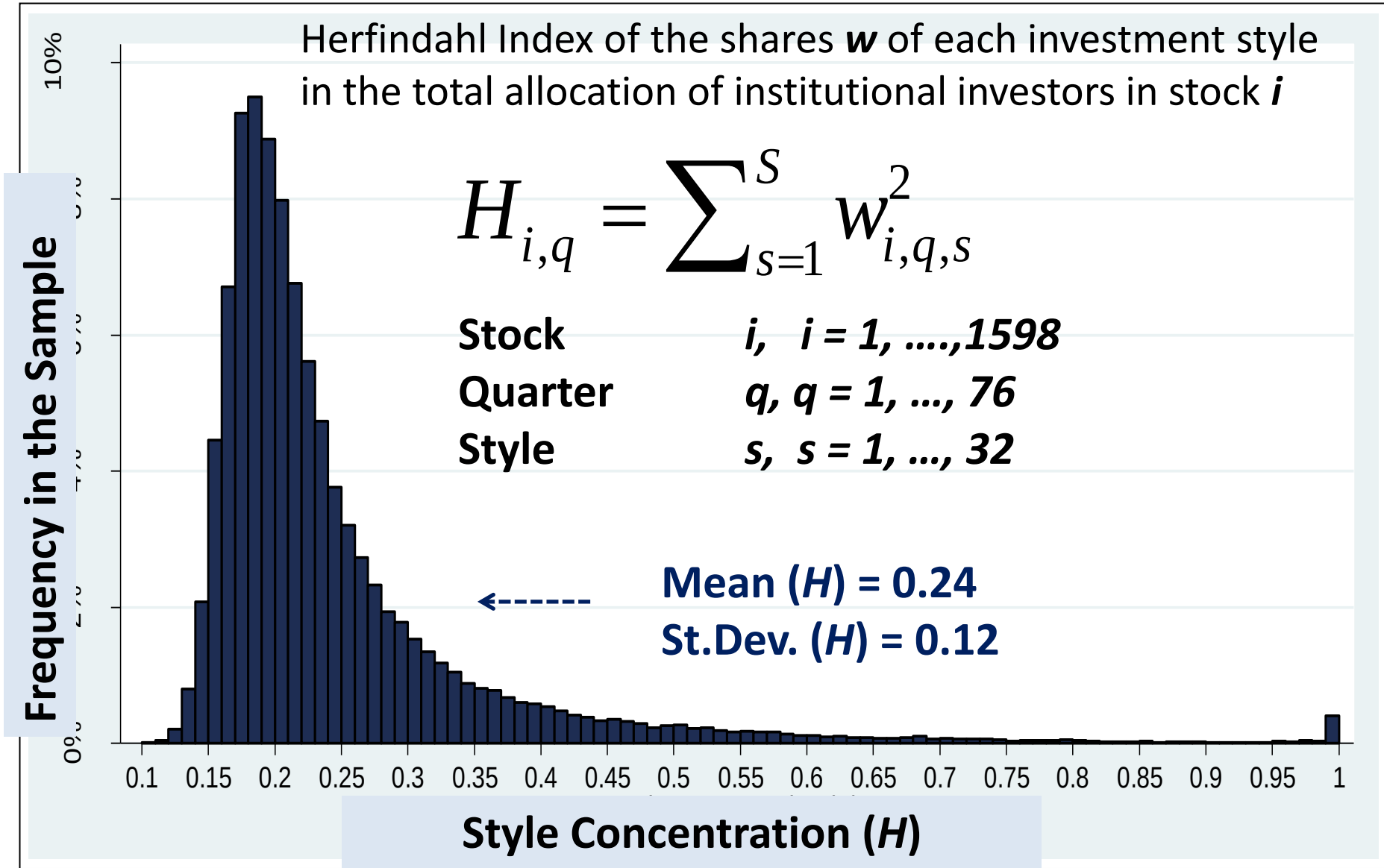
Source: Thomson Financial

I. Introduction: How dominant are the dominant styles in stock ownership?

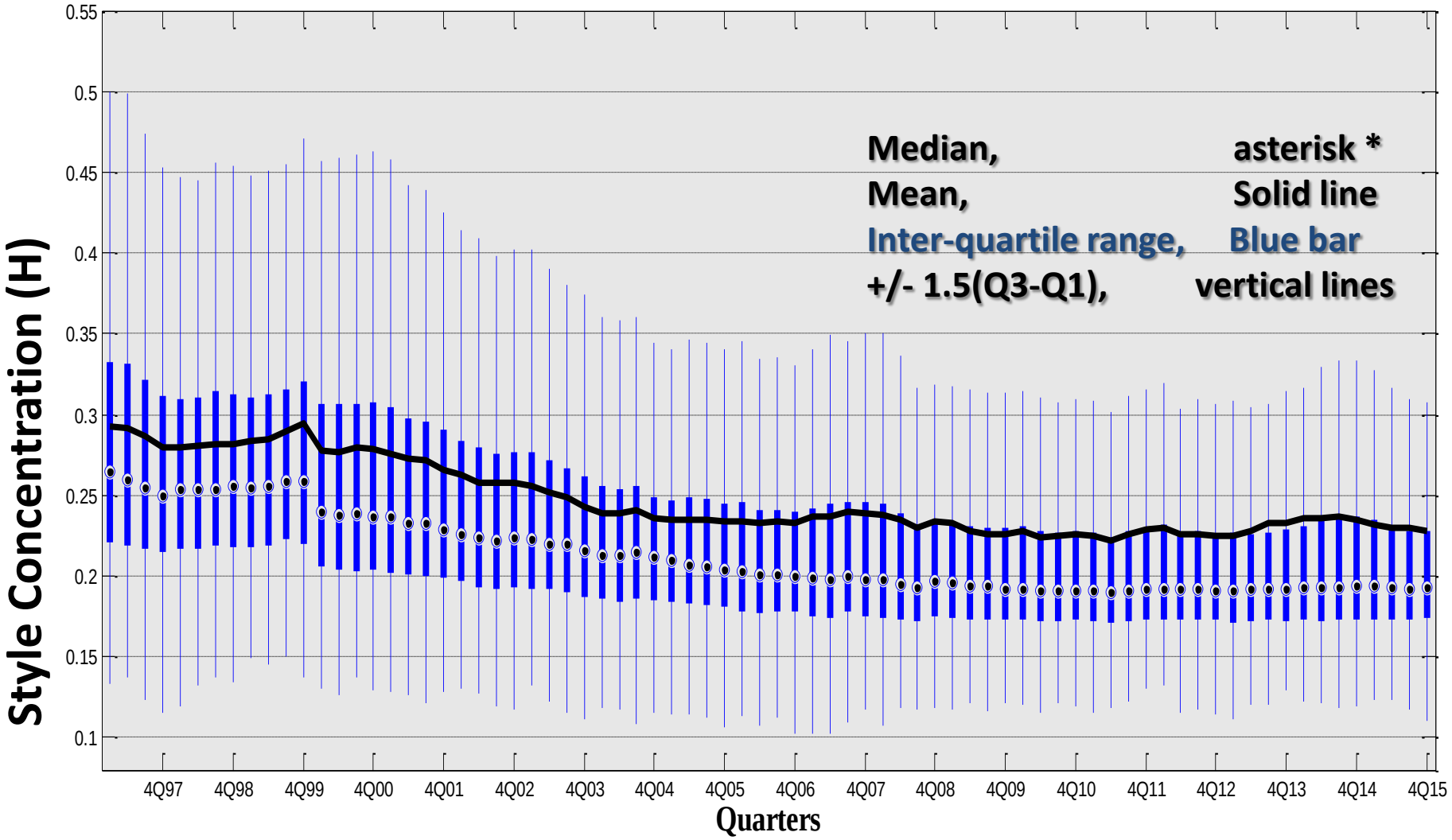
Stock ownership by style in a sample of a 2724 common stocks over 1997-2015 (on average 1598 stocks per quarter). For each stock and in each quarter and among institutional investors, we rank the % style participations into 1st, 2nd, 3rd, etc. The numbers below reflect simple averages across the 121,469 available stock-quarters. Only stocks with institutional ownership above 10% are included.	
Average # of investment styles in the ownership of a stock	10.84
% participation in a stock per quarter	
biggest style	42.35 %
2nd biggest style	23.19 %
3rd biggest style	16.02 %
4th biggest style	11.16 %
5th biggest style	7.27 %

II. Style inattention *H* – its pooled distribution

Total number of stock-quarters in the distribution: 121,469



II. The distribution of *H* over time



1997Q1 Quarters over time 2015Q4

II. The determinants of $H_{(t+1)}$

in Quarter (t)	(1)	(2)	(3)	(4)	(5)
H	0.888*** (159.2)	0.942*** (258.6)	0.911*** (201.8)	0.930*** (205.0)	0.927*** (238.7)
momentum		-0.224*** (-8.00)		-0.178*** (-6.06)	-0.192*** (-6.47)
style momentum		-0.627*** (-6.99)		-0.308*** (-3.47)	-0.277*** (-3.13)
ln(size)			-0.162*** (-18.3)	-0.069*** (-7.07)	-0.063*** (-6.16)
style co-movement				0.062*** (2.66)	0.060** (2.47)
Inst/Owner				-0.002** (-2.32)	
ln(B/M)				-0.002 (-0.10)	0.010 (0.52)
ln(D/A)				0.024 (1.05)	-0.007 (-0.33)
ln(volatility)				0.155*** (4.13)	0.120*** (3.04)
ln(turnover)				-0.100*** (-4.68)	-0.146*** (-6.44)
market beta				-0.064*** (-3.26)	-0.071*** (-3.74)

II. Style concentration & Merton's Model of limited participation

- The inattention created by style investing is similar to Merton's Presidential address (1987) lack of participation in stock investing.
- In Merton's extended CAPM, investors do not end up holding different fractions of classical "optimum" portfolios. In his model, in each security some investors refrain from buying due to exogenous reasons, and the remaining absorb all the supply. Absentee investors can vary from security to security.
- In general equilibrium, when markets clear, investors who participate in the (lower) demand for the security, absorb the total number of the existing supply of shares (at a lower price), moving away from their optimal portfolio. They are rewarded a premium for the deviation from optimality.
- The premium earned - over and above the market premium, is a function of the product of: (1) Market Size of security k, (2) Idiosyncratic Volatility of security k, (3) The inverse of participation in the total demand for security k:

$$ER_k \sim (size_k)\ (\sigma^2_k)\ (N/N_k)$$, where N is the universe of investors in the Stock Market, and N_k the number of participating investors in Security k

- Merton states his model can be extended to institutional investors, who may or may not be willing (or allowed) to participate in a specific stock.

II. The coexistence of style inattention with style investing

- The transient effects of style investing (Barberis and Shleifer, 2003) and the risk-premium that is created by the style inattention (Merton (1987)) co-exist
- Both effects are related to demand for stocks
- The transient effects are related with short-term demand variations that create momentum and reversal phenomena
- The effect of inattention is more permanent, generating a risk premium
- Investment institutions focus on specific stock subsets to exploit informational advantages from them

III. Forming portfolios based on *H*

- We form 10 equally-weighted portfolios on *H* from CRSP
- Rebalancing at the end of each quarter q.
- Every quarter, we allocate the same number of stocks per portfolio
- We measure their returns both in quarterly and monthly frequency
- We then use the monthly returns series of each *H*-portfolio and estimate the alphas and the betas of 5-factor Fama-French (2015) model (excess market return, size factor (SMB), value factor (HML), profitability factor (RMW) and investment factor (CMA)).
- Later, we perform dependent double-sorting,
  - first on size (3 groups, small (<20th NYSE percentile), mid-cap (20th percentile < <50th percentile) and big (>50th percentile))
  - and then on *H* (10 groups, sort within each size group),
  - hence creating a total of 30 portfolios

III. Portfolios on *H*: Quarterly Results and Other Characteristics of the *H*-portfolios

	Low *H*	2	3	4	5	6	7	8	9	High *H*	high minus low H
average return	3.85% (2.78)	3.80% (2.91)	3.89% (2.90)	3.54% (2.79)	3.62% (2.93)	4.06% (3.12)	4.00% (2.99)	4.21% (3.09)	4.44% (2.95)	6.22% (3.81)	2.37% (3.28)
mean *H*	0.157	0.175	0.187	0.197	0.207	0.220	0.235	0.261	0.311	0.522	
mean ln(size)	20.89	21.19	21.28	21.32	21.25	21.13	20.73	20.12	19.30	18.78	

- Positive relation between *H* and returns. Average quarterly return of long-short portfolio 2.37% (9.48% per year), with t-statistic = 3.28
- A lot of the cross sectional variation in both *H* and returns occurs at the extreme portfolios 8, 9, and 10
- Merton (1987) states that in order to observe significant cross-sectional differences on expected returns (from factors other than market risk), the investor participation should be significantly low. (q<<1 in his setting, H>>0 in our setting)

III. Portfolios on *H*: Monthly Results – Accounting for risk

	low *H*	2	3	4	5	6	7	8	9	high *H*	high minus low H
average returns	1.24% (3.06)	1.23% (3.24)	1.24% (3.25)	1.12% (3.08)	1.17% (3.23)	1.27% (3.46)	1.30% (3.40)	1.37% (3.57)	1.44% (3.64)	1.98% (4.58)	0.74% (3.06)
alphas	0.15% (1.12)	0.21% (1.78)	0.15% (1.47)	0.10% (1.04)	0.17% (1.60)	0.25% (2.33)	0.28% (2.53)	0.39% (3.20)	0.49% (3.20)	1.18% (5.25)	0.84% (3.60)
market beta	1.18 (33.42)	1.10 (35.42)	1.16 (45.10)	1.10 (45.31)	1.07 (39.71)	1.11 (40.40)	1.08 (37.22)	1.02 (32.17)	0.99 (24.97)	0.92 (15.87)	-0.26 (-4.23)
SMB beta	0.57 (12.39)	0.54 (13.28)	0.55 (16.28)	0.51 (16.00)	0.49 (13.82)	0.49 (13.74)	0.63 (16.63)	0.69 (16.70)	0.77 (14.77)	0.70 (9.21)	0.13 (1.64)
HML beta	0.32 (5.31)	0.38 (7.25)	0.25 (5.70)	0.33 (8.14)	0.24 (5.28)	0.26 (5.70)	0.30 (6.04)	0.38 (7.15)	0.30 (4.57)	0.25 (2.56)	-0.07 (-0.69)
RMW beta	0.15 (2.35)	0.17 (3.14)	0.27 (5.78)	0.19 (4.40)	0.12 (2.44)	0.18 (3.69)	0.12 (2.25)	0.05 (0.97)	0.02 (0.32)	-0.22 (-2.17)	-0.37 (-3.43)
CMA beta	0.08 (0.94)	-0.09 (-1.20)	0.03 (0.47)	0.00 (0.06)	0.12 (1.94)	0.05 (0.73)	0.00 (0.02)	-0.05 (-0.73)	-0.06 (-0.71)	-0.14 (-1.03)	-0.21 (-1.54)
adjusted R-square	0.90	0.91	0.94	0.94	0.93	0.93	0.92	0.91	0.87	0.76	0.17

- The alphas are positive, rise in magnitude and become statistically significant from portfolio 6 (t-statistic = 2.33) to portfolio 10 (t-statistic = 5.25)

III. Portfolios on *H*: Monthly Results – Accounting for risk

- It seems that
  - when *H* is sufficiently low, the average raw returns originate from risk premia of the known systemic risk factors, but
  - when *H* is higher, there is an extra "abnormal" return, which is related to inattention and limited style participation.
- The alpha of the long-short portfolio on *H* is 0.84% per month (10.08% per annum) with a t-statistic equal to 3.60, confirming that the effect of *H* is substantial and does not stem from any systematic risk factor.
- Stocks that are held by a large number of styles (stocks with low H) have a higher co-movement with the market relative to stocks that are only held by few styles (stocks with high H).
- Although there is a significant size risk factor present, this factor is not able to explain away the differences across the decile *H* portfolios.
- It seems that there is a relation between profitability and *H*.
- Only a small part of the *H* effect is attributable to the systematic risk factors (adj-R-sq. of hedging portfolio is only 17%)

III. Double sorting: first on size, then on *H*

	Low H	2	3	4	5	6	7	8	9	high H	high minus low H
Small Stocks (below 20th percentile of NYSE Market Value)											
alphas	0.60% (3.46)	0.46% (2.40)	0.26% (1.50)	0.51% (2.72)	0.19% (1.05)	0.81% (3.99)	0.55% (2.56)	0.95% (3.72)	1.01% (3.19)	1.96% (6.30)	1.17% (3.89)
mean H	0.163	0.189	0.206	0.222	0.239	0.261	0.289	0.329	0.399	0.604	
Mid-Cap Stocks (between the 20th and the 50th percentiles of NYSE Market Value)											
alphas	0.11% (0.58)	0.09% (0.44)	0.27% (1.63)	0.28% (1.82)	0.35% (2.46)	0.10% (0.63)	0.39% (2.67)	0.28% (1.70)	0.25% (1.46)	0.03% (0.15)	-0.26% (-0.94)
mean H	0.153	0.170	0.181	0.190	0.199	0.209	0.221	0.240	0.271	0.391	
Big Stocks (above 50th percentile of NYSE Market Value)											
alphas	0.14% (0.83)	0.11% (0.77)	0.05% (0.38)	-0.03% (-0.24)	0.01% (0.10)	0.12% (1.03)	0.06% (0.50)	0.12% (0.93)	0.08% (0.59)	0.09% (0.51)	-0.23% (-1.16)
mean H	0.157	0.173	0.182	0.190	0.197	0.205	0.214	0.225	0.242	0.316	

IV. Econometric Setup

- Stock returns of quarter (q+1) are regressed on the style concentration (*H*) and on other control variables (Z) of the earlier quarter (q):

$$r_{i,q+1} = a + \beta \cdot H_{i,q} + \Gamma' \cdot Z_{i,q} + e_{i,q+1}$$

- A pooled cross-sectional - time-series framework is used
- Quarterly dummies are included to address the "time-effect" and improve the estimation of standard errors (Petersen, 2009). They result in high R-bar^2
- The quarterly stock returns are not serially correlated, hence there is no need to correct for a "firm effect"
- The pooled framework with time dummies provides equivalent results to the traditional Fama-MacBeth regressions (Petersen (2009))
- We compute panel White (1980) standard errors to address the conditional heteroskedasticity of the error terms
- In multi-period returns, Newey-West (1987) standard errors are used to also address the serial correlation of returns, which is induced by construction from the overlapping of the predictive time intervals

IV. Description of Variables

- **DEPENDENT VARIABLE:**
  - The stock return of quarter q, is the percentage change of the stock price from the end of the previous quarter (q-1) to the end of the current quarter (q) plus the dividend yield that corresponds to quarter.
  - Multi-period stock returns (1, 2, 3 and 4 years) are the cumulative products of the individual gross quarterly returns.
- **ADDITIONAL INDEPENDENT VARIABLES:**
  - 5 Risk factors: classical CAPM market beta, the beta of the small-minus-big portfolio (SMB), the beta of the high-minus-low market-to-book portfolio (HML) , the beta of the robust-minus-weak profitability portfolio (RMW) and the beta of the conservative-minus-aggressive investment (CMA). (Fama and French, 2015)
  - We estimate them by running rolling time-series monthly regressions (24-36 months), of the excess monthly returns on the monthly prices of the factors.
  - The classical Market beta is also one of the determinant variables in Merton's model.

IV. Description of Variables (cont.)

- We use the natural logarithm of market capitalization of each stock since:
  - Size is a known determinant of stock returns
  - Size is included as determinant in Merton's model
  - Size is a major variable used to define the styles
- We use the natural logarithm of the market-to-book value ratio of the stock, which is also a well-known determinant of stock returns, and a major variable used in the style definition
- We use the natural logarithm of idiosyncratic volatility of each stock as an additional control:
  - It is included as a determinant of stock returns in Merton's model
  - It is found in many studies to predict future stock returns.
- We include illiquidity related controls (share turnover, ILLIQ (Amihud)), the momentum of each stock, and the natural logarithm of the debt-to-assets ratio (leverage).
- We use the momentum of the style that each stock belongs to.
- We use the comovement of each stock with the returns of its style.
- Finally, we include the share of each style in the ownership of stocks or their sum (which is the level of institutional ownership).

IV. Basic Econometric Results

From Table 8	(1)	(2)	(3)	(4)
H	0.277*** (5.83)	0.205*** (3.38)	0.215*** (3.20)	0.246*** (3.81)
ln(size)		-0.016*** (-8.64)	-0.071*** (-7.93)	-0.068*** (-7.66)
market beta		0.026*** (4.86)	0.022*** (3.28)	0.022*** (3.26)
ln(id-volatility)		0.078*** (9.23)	0.105*** (8.87)	0.107*** (9.04)
ln(B/M)			0.048*** (7.04)	0.044*** (6.96)
momentum			0.011 (1.05)	0.009 (0.89)
ln(turnover)			-0.031*** (-3.24)	-0.031*** (-3.26)
style momentum			0.062** (2.04)	0.063** (2.09)
style betas			0.015* (1.91)	0.015* (1.95)
I/O				-0.103*** (-5.09)
% style shares	-	-	YES	-
other controls	-	-	YES	YES
Adj-R^2 (%)	0.18	0.19	0.19	0.19
# of obs.	116318	106032	100683	100683

IV. Multi-period Econometric Results

Panel A: Univariate regressions

	6 months	1 year	2 years	3 years	4 years
H	0.281*** (6.55)	0.304*** (6.81)	0.263*** (5.33)	0.245*** (4.34)	0.291*** (4.47)
observations	113842	108859	99283	90517	82247

Panel B: Full specification regressions

	6 months	1 year	2 years	3 years	4 years
H	0.199*** (3.19)	0.185*** (2.81)	0.102 (1.45)	0.129 (1.60)	0.196** (2.18)
momentum	0.000 (0.04)	-0.040*** (-5.17)	-0.065*** (-12.36)	-0.043*** (-9.68)	-0.038*** (-8.67)
style momentum	-0.024 (-0.89)	-0.070** (-2.52)	-0.079*** (-3.28)	-0.049** (-2.15)	-0.041* (-1.94)
observations	100374	96395	88689	81264	74134

- The effect of *H* remains present in the longer horizons, supporting the risk premium explanation, which is consistent with Merton
- The effect of style inattention and the effect of style investing co-exist

V. More on Merton: interaction variables

	(1)	(2)	(3)	(4)	(5)	(6)
H		1.689*** (4.39)	0.205*** (3.38)	3.619*** (5.63)	0.998*** (2.82)	
ln(size)		0.002 (0.46)	-0.016*** (-8.64)	0.015** (2.06)		-0.262*** (-14.06)
ln(size)*H				-0.186*** (-5.74)		
ln(id-volatility)		-0.030 (-1.23)	0.078*** (9.23)		0.029 (1.32)	1.258*** (13.51)
H* ln(id-volatility)					0.228*** (2.62)	
ln(size)*ln(id-volatility)						-0.060*** (-13.53)
ln(size)*H* ln(id-volatility)	0.002*** (3.13)	0.021*** (4.42)				
market beta	0.027*** (5.17)	0.026*** (4.93)	0.026*** (4.86)			
Observations	106032	106032	106032	116317	115690	122026
Adjusted R2	0.19	0.19	0.19	0.18	0.18	0.19

V. The relation of style inattention with size and idiosyncratic volatility: discussion

- The triple interaction variable of H, size and idiosyncratic volatility is positive and statistically significant confirming the theoretical prediction of Merton.
- The coefficient of H remains positive and statistically significant in any specification.
- The coefficient of size is positive in the regressions with interaction variables with H!
  - This confirms the theoretical prediction about the effect of size.
  - In addition, it seems that the negative relation between size and expected returns is related with investors inattention. Size is a proxy of inattention.
- The idiosyncratic volatility has insignificant effect when it is included with *H*. Its significance comes when it is combined with style inattention.

VI. Conclusion

- There is clear evidence of an equilibrium effect due to style concentration or inattention in investing
- The effect of style inattention is described in Merton (1987) and co-exists with the style momentum and style reversals, as described by Barberis and Shleifer (2003)
- Inattention *H* is highly auto-correlated, positively correlated with size and volatility and negatively correlated with market beta and share turnover
- A long-short strategy based on *H* produces an alpha of 10.08 per year
- The unconditional annual premium for one standard deviation of style concentration is 3.32% (t-stat = 5.83)
- The relation continues to hold in a multi-period setting, indicating that the effect is not transient and is very different from the style investing effects which switch signs, showing reversals after their original momentum
- There is evidence consistent with Merton, which may explain part of the size effect: When the product of *H*, size and idiosyncratic volatility enters the regression to explain future returns, size no longer matters, it even switches sign. This is a promising future avenue for research

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Thank you for your attention!

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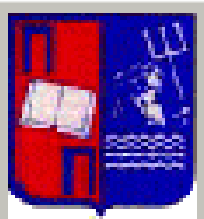

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