

Investing in Mutual Funds When Returns Are Predictable

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Past, Present and Future in Investment Management

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Importance of Studying Predictability in Mutual Fund Returns

- 1. Do mutual fund returns vary predictably over the business cycle?
- 2. What is the source of predictability in fund returns?
 - Benchmark return predictability?
 - Manager risk-loading predictability?
 - Manager talent predictability?
- 3. What is the economic significance of predictability?

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Predictability in Equity Markets

- Strong return predictability in U.S. equity markets, based on evolving macroeconomic information
 - Kandel and Stambaugh (1996) study asset allocation (equities vs. cash)—strong short-term predictability
 - Barberis (2000) studies long-term asset allocation—predictability leads to higher investment in equities on average
 - Avramov (2004) and Avramov and Chordia (2004) document the real-time profits attainable from using predictability in individual equities and in benchmarks

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Open-End, No-Load Mutual Funds

- \$4 trillion market (U.S. domestic-equity funds)
- Available each day at virtually no trading cost
 - Flow-related costs diluted among all shareholders
- Revalued each day at 4:00 p.m. NY time
- Thousands of funds

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Predictability in Mutual Fund Markets

- Some studies document predictability in institutional funds (pension funds and mutual funds)
 - Ferson and Schadt (1996)—pension funds—predictable risk-loadings
 - Christopherson, Ferson, and Glassman (1998)—pension funds—predictable manager alphas
 - Moskowitz (2000), Kosowski (2004), and Lynch, Wachter, Boudry (2004)—alphas higher in recessions

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Our Paper Studies Predictability in a Bayesian Optimizing Framework

- Predictable risk-loadings
- Predictable benchmark returns
- Predictable manager talent (alpha)

$$r_{it} = \alpha_{i0} + \alpha'_{i1} z_{t-1} + \beta'_{i0} f_t + \beta'_{i1} (f_t \otimes z_{t-1}) + v_{it}, \quad (1)$$

$$f_t = a_f + A_f z_{t-1} + v_{ft}, \quad (2)$$

$$z_t = a_z + A_z z_{t-1} + v_{zt}. \quad (3)$$

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Measuring Performance at the Net Return Level

Measure 1: Alpha from Jensen model (**MKT**)

Measure 2: Alpha from Fama-French model (**MKT, SMB, HML**)

Measure 3: Alpha from Carhart model (**MKT, SMB, HML, WML**)

- Regress time-series of monthly mutual fund excess returns on portfolio returns accruing to four zero-investment factor-mimicking portfolios:
 - CRSP value-weighted index less T-bills (**MKT**)
 - Small size minus big size (**SMB**)
 - High book-to-market minus low book-to-market (**HML**)
 - High prior-year return less low prior-year return (**WML**)

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Predictive Variables

- Three-month T-bill yield
- CRSP NYSE/AMEX dividend yield
- Slope of the term structure
- Quality spread in corporate bonds

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Optimization by Mean-Variance Investor ("Hedge Fund")

- Each month:
 - Predictability equations are used to update priors about:
 - Risk-loadings
 - Benchmark returns
 - Manager alpha
 - Weights are changed each month to account for updates obtained from latest month's fund returns
 - Optimal weights are formed to maximize the "hedge fund's" Sharpe ratio, using Bayesian predictive moments

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Three Types of Bayesian Investors ("Hedge Funds")

- The "Dogmatist"—no belief whatsoever in active mutual fund manager talent

$$\alpha \equiv -1/12(\exp + .01 \times \text{turnover})$$

- Subgroups:
 - **ND = No-Predictability Dogmatist**
 - **PD = Predictability Dogmatist**
 - **PD-1:** Predictable betas by mutual funds
 - **PD-2:** Predictable betas and factors

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The No-Predictability Dogmatist (ND)

$$r_{it} = \alpha_{i0} + \alpha'_{i1} z_{t-1} + \beta'_{i0} f_t + \beta'_{i1} (f_t \otimes z_{t-1}) + v_{it}, \quad (1)$$

$$f_t = a_f + A_f z_{t-1} + v_{ft}, \quad (2)$$

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The Predictability Dogmatist (PD-2)

$$r_{it} = \alpha_{i0} + \alpha'_{i1} z_{t-1} + \beta'_{i0} f_t + \beta'_{i1} (f_t \otimes z_{t-1}) + v_{it}, \quad (1)$$

$$f_t = a_f + A_f z_{t-1} + v_{ft}, \quad (2)$$

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- The “Skeptic”—allows for possibility of talent, but beliefs are centered around no talent

$$\alpha \approx N(-1/12\text{exp}, 1\%)$$

- Subgroups:
 - **NS = No-Predictability Skeptic**
 - **PS = Predictability Skeptic**
 - **PS-1:** Predictable betas by mutual funds
 - **PS-2:** Predictable betas and factors
 - **PS-3:** Predictable alphas
 - **PS-4:** Predictable alphas, betas, and factors

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The No-Predictability Skeptic (NS)

$$r_{it} = \alpha_{i0} + \alpha'_{i1} z_{t-1} + \beta'_{i0} f_t + \beta'_{i1} (f_t \otimes z_{t-1}) + v_{it}, \quad (1)$$

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The Predictability Skeptic (PS-4)

$$r_{it} = \alpha_{i0} + \alpha'_{i1} z_{t-1} + \beta'_{i0} f_t + \beta'_{i1} (f_t \otimes z_{t-1}) + v_{it}, \quad (1)$$

$$f_t = a_f + A_f z_{t-1} + v_{ft}, \quad (2)$$

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- The “Agnostic”—allows for possibility of talent, and beliefs are completely diffuse

$$\alpha \approx N(-1/12\text{exp}, \infty)$$

- Subgroups:
 - **NA = No-Predictability Agnostic**
 - **PA = Predictability Agnostic**
 - **PA-1:** Predictable betas by mutual funds
 - **PA-2:** Predictable betas and factors
 - **PA-3:** Predictable alphas
 - **PA-4:** Predictable alphas, betas, and factors

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The No-Predictability Agnostic (NA)

$$r_{it} = \alpha_{i0} + \alpha'_{i1} z_{t-1} + \beta'_{i0} f_t + \beta'_{i1} (f_t \otimes z_{t-1}) + v_{it}, \quad (1)$$

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The Predictability Agnostic (PA-4)

$$r_{it} = \alpha_{i0} + \alpha'_{i1} z_{t-1} + \beta'_{i0} f_t + \beta'_{i1} (f_t \otimes z_{t-1}) + v_{it}, \quad (1)$$

$$f_t = a_f + A_f z_{t-1} + v_{ft}, \quad (2)$$

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Measuring “Cash” Inflows and Outflows

- Computed as percentage change in shares outstanding for a given mutual fund (derived from TNA and NAV values for the fund):

$$Flow_{i,t} = (SHROUT_{i,t} - SHROUT_{i,t-1}) / SHROUT_{i,t-1}$$

- End-of-period SHROUT is adjusted for any share splits or cash distributions during the period
- Before 1991: quarterly flows—form geo-mean monthly flows as estimate of monthly
- Starting 1991: monthly flows

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The Databases Used in this Paper

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The CDA Mutual Fund Database

- End-of-quarter equity holdings of virtually all publicly traded equity mutual funds
- 1975-2002
- Quarterly Investment objectives from 6/30/80 (supplemented by 12/31/74 data)
- No survivorship bias

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The CRSP Mutual Fund Database

- Contains, for all mutual funds existing at any time between 1962 and 2002:
 - monthly net returns
 - annual portfolio turnover
 - annual expense ratios
- No survivorship bias

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The Database Linking Process

- Funds were matched through similarities in:
 - Fund names
 - Management company names
 - Total assets under management
 - Self-declared investment objectives
 - Estimate >99% match success rate
- The resulting “Links” table is available via WRDS at Wharton
 - Updated frequently, and error-checked

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Success of Database Merging (Wermers (2000)): Example

- Limited to funds having an investment objective of AG, G, GI, I, or B:
 - All funds in CRSP are matched to a CDA fund from 1975-1990
 - Unmatched funds:
 - 11 out of 690 in 1991
 - 14 out of 829 in 1992
 - 31 out of 980 in 1993
 - 54 out of 1,333 in 1994
 - Total of 110 fund-years out of 10,000 fund-years

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Potential Sources of Bias in the Merged Database

- **“Survival Bias”**—likely very minimal, and will not impact TNA-averaged results significantly
- **“Incubator Bias”**—related to survival bias—only relevant if “crib deaths” occurring to funds available to the public did not make it into the databases—trivial impact on TNA results anyway
- **“Inherited Performance Record Bias”**—merging fund “inherits” performance record of better fund—no known impact, as the CRSP mutual fund database used net returns available each year, not backfilled numbers

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Table 1: Summary Statistics on Funds

Investment objective	Fund's return history in months					
	48-66	67-84	85-108	109-156	157-336	All
Aggressive Growth	8	19	26	24	44	121
	15.2	10.6	11.3	11.5	14.4	12.6
	58.2	35.2	36.1	162.6	264.7	123.1
Growth	146	216	155	144	146	807
	5.7	8.9	10.2	10.3	12.8	10.1
	41.4	69.8	116.6	185.1	267.7	100.0
Growth & Income	19	28	49	72	57	225
	5.4	6.3	10.7	9.8	11.6	10.0
	40.4	151.7	96.8	336.2	249.0	165.4
Metal and others	99	15	9	10	15	148
	2.1	5.6	8.4	10.5	12.0	5.2
	45.8	54.5	73.9	345.6	139.1	67.4
- Total # of funds	272	278	239	250	262	1301 -

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Results

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Table 2: Ex-Ante CAPM Model Results

	The Dogmatist			The Skeptic				The Agnostic					
	ND	PD-1	PD-2	NS	PS-1	PS-2	PS-3	PS-4	NA	PA-1	PA-2	PA-3	PA-4
White Oak Growth	0.0	0.0	19.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scudder Equity 500 Index	4.7	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neuberger Berman Focus	0.0	0.0	35.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flag Investors Communications	0.0	0.0	11.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AXP Precious Metals	0.0	0.0	0.0	0.0	0.0	0.0	10.4	7.0	0.0	0.0	0.0	18.0	6.9
Scudder Technology	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pin Oak Aggressive Stock	0.0	0.0	9.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
T Rowe Price Science & Technology	0.0	0.0	14.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scudder Gold Precious Metals	0.0	0.0	0.0	0.0	0.0	0.0	28.7	9.0	0.0	0.0	0.0	25.3	0.0
State Farm Growth Fund	13.8	20.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
USAA Precious Metals	0.0	0.0	0.0	0.0	0.0	0.0	60.9	65.6	0.0	0.0	0.0	30.8	34.4
Vanguard Institutional Index	20.7	19.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vanguard Total Stock Market Index	60.8	55.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PIMCO Funds PEA Innovation	0.0	0.0	0.0	0.0	0.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Munder Funds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.7	0.0	0.0	0.0	10.8	27.5
Needham Growth Fund	0.0	0.0	0.0	3.7	13.9	3.9	0.0	0.0	0.0	16.6	5.3	0.0	0.0
Bjurman Barry Micro Cap Growth	0.0	0.0	0.0	17.0	4.0	0.0	0.0	0.0	8.6	0.0	0.0	0.0	0.0
Evergreen Small Company Value	0.0	0.0	6.4	0.0	0.0	7.4	0.0	0.0	0.0	0.0	7.2	0.0	0.0
BlackRock US Opportunities	0.0	0.0	0.0	11.6	9.9	0.0	0.0	0.0	13.6	11.4	2.9	0.0	0.0
Morgan Stanley Small Cap Growth	0.0	0.0	0.0	44.7	54.5	38.7	0.0	0.0	52.2	60.2	42.2	0.0	0.0
ProFunds UltraOTC	0.0	0.0	0.0	0.0	0.0	13.0	0.0	13.7	0.0	0.0	11.7	0.0	31.2
Rydex Srs Tr Electronics	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	22.7	0.0	0.0
Strong Enterprise	0.0	0.0	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Kinetics Internet	0.0	0.0	0.0	23.0	13.2	9.4	0.0	0.0	25.6	11.8	8.0	15.1	0.0
December 2002:													
Certainty Equivalent Loss (bp/month)		0.0	15.1		1.3	13.7	89.1	89.6		2.0	11.9	95.0	105.5
Sharpe Ratio (monthly)	0.13	0.13	0.37	0.36	0.44	0.56	0.75	0.81	0.42	0.54	0.64	1.16	1.09

Table 2: Ex-Ante CAPM Model Results

	The Dogmatist			The Skeptic					The Agnostic				
	ND	PD-1	PD-2	NS	PS-1	PS-2	PS-3	PS-4	NA	PA-1	PA-2	PA-3	PA-4
White Oak Growth	0.0	0.0	19.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scudder Equity 500 Index	4.7	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Neuberger Berman Focus	0.0	0.0	35.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flag Investors Communications	0.0	0.0	11.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AXP Precious Metals	0.0	0.0	0.0	0.0	0.0	0.0	10.4	7.0	0.0	0.0	0.0	18.0	6.9
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Scudder Gold Precious Metals	0.0	0.0	0.0	0.0	0.0	0.0	28.7	9.0	0.0	0.0	0.0	25.3	0.0
State Farm Growth Fund	13.8	20.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
USAA Precious Metals	0.0	0.0	0.0	0.0	0.0	0.0	60.9	65.6	0.0	0.0	0.0	30.8	34.4
Vanguard Institutional Index	20.7	19.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vanguard Total Stock Market Index	60.8	55.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PIMCO Funds PEA Innovation	0.0	0.0	0.0	0.0	0.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Munder Funds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.7	0.0	0.0	0.0	10.8	27.5
Needham Growth Fund	0.0	0.0	0.0	3.7	13.9	3.9	0.0	0.0	0.0	16.6	5.3	0.0	0.0
Bjurman Barry Micro Cap Growth	0.0	0.0	0.0	17.0	4.0	0.0	0.0	0.0	8.6	0.0	0.0	0.0	0.0
Evergreen Small Company Value	0.0	0.0	6.4	0.0	0.0	7.4	0.0	0.0	0.0	0.0	7.2	0.0	0.0
BlackRock US Opportunities	0.0	0.0	0.0	11.6	9.9	0.0	0.0	0.0	13.6	11.4	2.9	0.0	0.0
Morgan Stanley Small Cap Growth	0.0	0.0	0.0	44.7	54.5	38.7	0.0	0.0	52.2	60.2	42.2	0.0	0.0
ProFunds UltraOTC	0.0	0.0	0.0	0.0	0.0	13.0	0.0	13.7	0.0	0.0	11.7	0.0	31.2
Rydex Srs Tr Electronics	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	22.7	0.0	0.0
Strong Enterprise	0.0	0.0	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Kinetics Internet	0.0	0.0	0.0	23.0	13.2	9.4	0.0	0.0	25.6	11.8	8.0	15.1	0.0
December 2002:													
Certainty Equivalent Loss (bp/month)		0.0	15.1		1.3	13.7	89.1	89.6		2.0	11.9	95.0	105.5
Sharpe Ratio (monthly)	0.13	0.13	0.37	0.36	0.44	0.56	0.75	0.81	0.42	0.54	0.64	1.16	1.09

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Neuberger Berman Focus	0.0	0.0	35.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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AXP Precious Metals	0.0	0.0	0.0	0.0	0.0	0.0	10.4	7.0	0.0	0.0	0.0	18.0	6.9
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December 2002:													
Certainty Equivalent Loss (bp/month)		0.0	15.1		1.3	13.7	89.1	89.6		2.0	11.9	95.0	105.5
Sharpe Ratio (monthly)	0.13	0.13	0.37	0.36	0.44	0.56	0.75	0.81	0.42	0.54	0.64	1.16	1.09

Table 5: Out-of-Sample Investment Results (Monthly Rebalance, Beginning 12/31/79)

Panel A: The entire investment period

	The Dogmatist			The Skeptic					The Agnostic					Previously Studied		
	ND	PD-1	PD-2	NS	PS-1	PS-2	PS-3	PS-4	NA	PA-1	PA-2	PA-3	PA-4	H-H	CAR	SM
μ	6.39	6.58	6.74	6.92	5.56	6.06	15.14	11.5	7.07	5.26	5.89	16.52	12.12	8.97	5.42	5.78
std	0.16	0.16	0.16	0.21	0.21	0.18	0.28	0.21	0.21	0.21	0.18	0.28	0.22	0.20	0.19	0.17
SR	0.39	0.41	0.43	0.33	0.27	0.34	0.55	0.54	0.33	0.25	0.33	0.59	0.54	0.44	0.28	0.34
$skew$	-0.71	-0.68	0.03	-0.20	-0.38	-0.28	1.13	0.32	-0.18	-0.35	-0.31	1.05	0.21	-0.52	-0.57	-0.76
α_{cpm}	-0.23	0.00	1.92	-0.38	-1.89	0.71	8.12	6.48	-0.23	-2.16	0.54	9.46	6.73	1.95	-1.86	-0.99
$P(\alpha_{cpm})$	0.66	1.00	0.38	0.88	0.36	0.79	0.07	0.08	0.93	0.31	0.84	0.04	0.08	0.39	0.26	0.32
α_{ff}	0.60	1.03	0.91	2.33	0.29	-0.51	11.14	6.86	2.49	0.06	-0.46	12.89	7.88	3.48	-0.39	-0.17
$P(\alpha_{ff})$	0.22	0.04	0.68	0.22	0.87	0.85	0.01	0.05	0.20	0.97	0.86	0.00	0.03	0.04	0.74	0.81
α_{wmi}	0.37	0.62	3.92	-1.30	-2.49	0.83	5.98	4.95	-1.29	-2.83	0.51	8.46	6.20	-0.99	-0.48	-1.10
$P(\alpha_{wmi})$	0.46	0.22	0.07	0.45	0.13	0.76	0.14	0.17	0.47	0.10	0.85	0.04	0.10	0.46	0.69	0.06
$\tilde{\alpha}_{cpm}$	-0.09	0.14	1.85	0.14	-1.75	0.66	9.01	6.36	0.25	-1.99	0.49	10.52	6.76	1.97	-1.50	-0.99
$P(\tilde{\alpha}_{cpm})$	0.87	0.80	0.40	0.96	0.40	0.80	0.05	0.08	0.92	0.35	0.85	0.02	0.08	0.39	0.35	0.32
$\tilde{\alpha}_{ff}$	0.20	0.84	0.91	2.96	1.02	0.29	13.30	9.28	3.10	1.03	0.65	14.84	9.13	4.45	0.30	0.29
$P(\tilde{\alpha}_{ff})$	0.64	0.05	0.62	0.12	0.55	0.90	0.00	0.01	0.11	0.56	0.79	0.00	0.01	0.00	0.79	0.67
$\tilde{\alpha}_{wmi}$	0.24	0.69	1.90	-0.84	-1.99	-0.37	9.44	7.88	-0.78	-2.01	-0.19	11.17	7.28	0.08	-0.57	-1.05
$P(\tilde{\alpha}_{wmi})$	0.59	0.12	0.30	0.61	0.23	0.88	0.02	0.03	0.65	0.24	0.94	0.00	0.05	0.95	0.61	0.08

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Optimal Portfolio Attributes (Table 6)

	The Dogmatist			The Skeptic					The Agnostic					Previously Studied		
	ND	PD-1	PD-2	NS	PS-1	PS-2	PS-3	PS-4	NA	PA-1	PA-2	PA-3	PA-4	H-H	CAR	SM
Overall																
CS	0.39	0.26	2.13	0.57	1.47	2.99	7.19	4.38	0.47	1.06	2.78	8.10	6.02	3.30	0.38	1.84
$P(CS)$	0.28	0.51	0.36	0.72	0.36	0.38	0.09	0.31	0.77	0.51	0.42	0.05	0.19	0.08	0.82	0.05
$Lag_{12}(Ret)$	7.92	8.75	8.54	26.89	22.68	17.53	37.71	28.70	26.69	22.55	17.68	38.73	29.58	29.78	19.33	19.56
TNA	388.73	343.74	201.40	343.47	296.58	224.68	170.39	149.13	318.45	286.68	216.20	146.77	139.68	175.61	195.34	243.97
$Size$	4.58	4.62	4.05	3.61	4.04	3.69	3.62	3.61	3.52	3.99	3.63	3.55	3.60	3.63	3.68	3.95
BM	2.70	2.72	2.70	2.51	2.49	2.44	2.45	2.47	2.53	2.49	2.43	2.48	2.44	2.52	2.51	2.62
MOM	3.01	3.03	2.98	3.81	3.88	3.44	3.66	3.35	3.79	3.86	3.45	3.61	3.39	3.70	3.41	3.40
$Turnover$	1.71	1.91	3.79	9.01	9.29	7.72	8.37	7.85	9.29	9.53	8.05	8.75	7.49	8.43	8.44	7.56
$Flow$	2.57	2.49	3.51	5.23	4.52	4.67	6.75	6.54	5.47	4.69	4.93	7.28	6.96	5.91	4.54	6.01
$ExpenseRatio$	0.02	0.02	0.08	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.12	0.11	0.11	0.11	0.09
$IndexFunds$	0.54	0.52	0.15	0.03	0.02	0.02	0.02	0.01	0.03	0.03	0.02	0.02	0.01	0.02	0.01	0.08
$ManagerExperience$	85.53	88.61	123.46	155.84	179.45	120.79	120.24	111.92	148.33	171.58	117.97	108.92	106.46	99.11	105.77	97.92

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Optimal Portfolio Industry Weights (Table 7)—Averaged Over All Months

	The Dogmatist			The Skeptic				The Agnostic				Previously Studied			SM	
	ND	PD-1	PD-2	NS	PS-1	PS-2	PS-3	PS-4	NA	PA-1	PA-2	PA-3	PA-4	H-H		CAR
Overall																
Buseq	0.24	0.20	0.11	0.19	0.19	0.11	0.17	0.11	0.20	0.19	0.11	0.17	0.12	0.18	0.20	0.16
Chems	0.06	0.07	0.02	0.02	0.03	0.01	0.02	0.01	0.02	0.03	0.01	0.02	0.01	0.03	0.03	0.04
Durbl	0.02	0.03	0.02	0.03	0.03	0.02	0.02	0.01	0.03	0.03	0.02	0.02	0.01	0.03	0.03	0.04
Enrgy	0.07	0.08	0.09	0.04	0.07	0.15	0.08	0.14	0.03	0.08	0.16	0.09	0.14	0.07	0.07	0.07
Hlth	0.13	0.13	0.06	0.10	0.09	0.05	0.07	0.04	0.10	0.09	0.05	0.07	0.04	0.10	0.10	0.08
Manuf	0.12	0.11	0.06	0.11	0.09	0.08	0.09	0.06	0.11	0.09	0.08	0.08	0.06	0.11	0.10	0.12
Money	0.13	0.12	0.24	0.22	0.21	0.25	0.18	0.24	0.22	0.20	0.25	0.18	0.23	0.17	0.16	0.17
NoDur	0.07	0.08	0.04	0.07	0.06	0.06	0.05	0.05	0.06	0.06	0.05	0.04	0.05	0.06	0.07	0.07
Shops	0.05	0.05	0.07	0.09	0.10	0.06	0.05	0.04	0.09	0.10	0.07	0.05	0.04	0.10	0.09	0.10
Telcm	0.04	0.05	0.03	0.06	0.06	0.04	0.06	0.05	0.06	0.06	0.04	0.06	0.05	0.04	0.05	0.04
Utils	0.02	0.04	0.17	0.01	0.01	0.07	0.07	0.07	0.01	0.01	0.07	0.07	0.07	0.04	0.03	0.05
Metals	0.00	0.02	0.11	0.01	0.06	0.17	0.15	0.24	0.01	0.06	0.17	0.16	0.23	0.05	0.07	0.02
Others	0.05	0.05	0.07	0.10	0.10	0.08	0.09	0.09	0.09	0.10	0.08	0.08	0.09	0.10	0.10	0.10

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Optimal Portfolio Industry Weights (Table 7)—Averaged Over Expansions

	The Dogmatist			The Skeptic				The Agnostic				Previously Studied			SM	
	ND	PD-1	PD-2	NS	PS-1	PS-2	PS-3	PS-4	NA	PA-1	PA-2	PA-3	PA-4	H-H		CAR
Buseq	0.25	0.21	0.09	0.19	0.18	0.08	0.17	0.09	0.20	0.18	0.09	0.17	0.11	0.19	0.20	0.17
Chems	0.06	0.07	0.03	0.02	0.03	0.01	0.02	0.01	0.02	0.03	0.01	0.02	0.01	0.03	0.03	0.04
Durbl	0.02	0.03	0.02	0.03	0.03	0.02	0.02	0.01	0.03	0.03	0.02	0.02	0.01	0.03	0.03	0.04
Enrgy	0.06	0.07	0.08	0.03	0.06	0.14	0.08	0.14	0.03	0.07	0.15	0.09	0.13	0.06	0.06	0.06
Hlth	0.13	0.13	0.05	0.09	0.08	0.04	0.06	0.03	0.09	0.08	0.04	0.06	0.03	0.10	0.10	0.08
Manuf	0.11	0.11	0.06	0.11	0.09	0.08	0.08	0.06	0.11	0.09	0.08	0.07	0.06	0.11	0.10	0.11
Money	0.14	0.13	0.26	0.23	0.22	0.28	0.19	0.26	0.24	0.22	0.27	0.19	0.26	0.17	0.16	0.17
NoDur	0.07	0.08	0.05	0.07	0.06	0.06	0.05	0.05	0.07	0.06	0.05	0.04	0.05	0.06	0.07	0.07
Shops	0.04	0.05	0.06	0.08	0.10	0.06	0.05	0.03	0.09	0.10	0.06	0.05	0.03	0.10	0.09	0.09
Telcm	0.04	0.05	0.03	0.06	0.06	0.04	0.07	0.05	0.06	0.06	0.04	0.06	0.06	0.04	0.05	0.05
Utils	0.02	0.04	0.20	0.01	0.01	0.08	0.07	0.08	0.01	0.01	0.08	0.07	0.08	0.04	0.03	0.05
Metals	0.00	0.01	0.11	0.01	0.06	0.18	0.16	0.26	0.01	0.06	0.19	0.18	0.25	0.05	0.07	0.02
Others	0.05	0.05	0.06	0.09	0.10	0.08	0.08	0.08	0.09	0.10	0.08	0.07	0.09	0.10	0.10	0.10

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Optimal Portfolio Industry Weights (Table 7)—Averaged Over Recessions

	The Dogmatist			The Skeptic				The Agnostic				Previously Studied			
	ND	PD-1	PD-2	NS	PS-1	PS-2	PS-3	PS-4	NA	PA-1	PA-2	PA-3	PA-4	H-H	CAR
Buseq	0.20	0.16	0.25	0.19	0.23	0.23	0.19	0.23	0.19	0.23	0.16	0.22	0.13	0.18	0.15
Chems	0.05	0.05	0.02	0.03	0.02	0.01	0.02	0.02	0.03	0.02	0.01	0.02	0.02	0.03	0.04
Durbl	0.03	0.03	0.01	0.02	0.01	0.01	0.03	0.01	0.02	0.01	0.01	0.02	0.01	0.02	0.03
Enrgy	0.12	0.18	0.19	0.08	0.14	0.19	0.11	0.20	0.09	0.15	0.20	0.12	0.21	0.12	0.13
Hlth	0.11	0.11	0.11	0.17	0.13	0.12	0.11	0.10	0.17	0.12	0.11	0.11	0.11	0.09	0.09
Manuf	0.14	0.13	0.07	0.12	0.09	0.08	0.11	0.07	0.11	0.09	0.08	0.11	0.07	0.11	0.13
Money	0.11	0.11	0.08	0.10	0.08	0.10	0.13	0.09	0.11	0.08	0.10	0.15	0.10	0.17	0.13
NoDur	0.08	0.07	0.03	0.06	0.05	0.03	0.07	0.02	0.05	0.04	0.03	0.07	0.02	0.07	0.05
Shops	0.07	0.07	0.09	0.10	0.09	0.09	0.08	0.07	0.10	0.09	0.09	0.08	0.08	0.10	0.10
Telecom	0.03	0.04	0.04	0.05	0.07	0.05	0.05	0.04	0.05	0.07	0.05	0.05	0.04	0.03	0.05
Utils	0.03	0.03	0.01	0.04	0.02	0.02	0.06	0.02	0.04	0.01	0.02	0.06	0.02	0.05	0.03
Metals	0.01	0.08	0.09	0.02	0.05	0.06	0.09	0.13	0.02	0.06	0.06	0.08	0.11	0.04	0.08
Others	0.06	0.07	0.11	0.13	0.10	0.10	0.15	0.11	0.13	0.11	0.10	0.15	0.11	0.13	0.12

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Table 8: Industry Attribution

	The Dogmatist			The Skeptic				The Agnostic				Previously Studied				
	ND	PD-1	PD-2	NS	PS-1	PS-2	PS-3	PS-4	NA	PA-1	PA-2	PA-3	PA-4	H-H	CAR	SM
$\tilde{\mu}$	12.68	12.88	13.02	13.30	11.88	12.33	21.18	17.80	13.48	11.56	12.17	22.82	18.47	15.27	11.72	12.58
$\tilde{\mu}^I$	13.03	12.96	13.93	12.41	12.94	13.40	16.72	15.11	12.13	13.06	13.43	15.72	14.14	13.13	12.81	13.19
$\tilde{\mu} - \tilde{\mu}^I$	-0.34	-0.09	-0.91	0.89	-1.07	-1.07	4.47	2.69	1.35	-1.50	-1.26	7.10	4.33	2.13	-1.09	-0.61
$P(\tilde{\mu} - \tilde{\mu}^I)$	0.50	0.87	0.66	0.70	0.59	0.67	0.23	0.42	0.57	0.46	0.61	0.06	0.18	0.29	0.49	0.51
$\tilde{\mu}^{IP}$	13.72	13.75	13.16	13.98	13.61	13.06	12.73	12.29	13.98	13.58	13.03	12.74	12.31	13.51	13.34	13.69
$\tilde{\mu}^I - \tilde{\mu}^{IP}$	-0.69	-0.79	0.78	-1.57	-0.67	0.34	3.98	2.82	-1.85	-0.52	0.40	2.98	1.82	-0.38	-0.53	-0.49
$P(\tilde{\mu}^I - \tilde{\mu}^{IP})$	0.22	0.19	0.52	0.04	0.36	0.74	0.03	0.07	0.03	0.47	0.74	0.11	0.30	0.68	0.48	0.39
Net return:																
α_{wml}	0.37	0.62	3.92	-1.30	-2.49	0.83	5.98	4.95	-1.29	-2.83	0.51	8.46	6.20	-0.99	-0.48	-1.10
$P(\alpha_{wml})$	0.46	0.22	0.07	0.45	0.13	0.76	0.14	0.17	0.47	0.10	0.85	0.04	0.10	0.46	0.69	0.06

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Summary of Findings

- Strong predictability in mutual fund returns
- Biggest impact: predictability in mutual fund alphas
- Industry timing contributes 1-3% per year to predictable alpha profits
- Mutual fund selection (within industry) contributes the remaining 3-6% per year to predictable alpha profits
- Significant not only for investment implications, but also makes a big statement about the value of active management

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Webpage Address

A copy of the latest version of the paper supporting this presentation can be obtained from the web page

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