Time-Varying Skill

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Attention Allocation Problem

- Decision makers face an abundance of available information and they must choose how to allocate their limited attention. Do they allocate it rationally?
- Problem: Information choices are not observable
- Our strategy:
  - Business-cycle variation changes the optimal allocation (a theory)
  - Look for evidence of these changes (empirical work)
- Our data: Mutual fund managers
  - An important part of economy ($14 trillion invested)
  - Primary business is acquiring and processing information

Outline

- Empirical evidence that mutual fund skill fluctuates over the business cycle
  - Portfolio positions co-move more with aggregate economy in recessions (market timing) and more with stock-specific component of returns in expansions (stock picking)
  - *Same* managers that are good at stock picking in expansions that are good at market timing in recessions
  - These managers outperform
  - Skilled managers can be identified in real time
- A theory for why mutual funds reallocate attention over the business cycle.
  - Recessions are times of high aggregate risk and a high price of risk.
  - Theory has additional testable implications: Attention reallocation works through fundamentals & Increase in portfolio dispersion in recessions

Do People Shift Attention in Recessions?

Data

- Actively managed open-end U.S. equity mutual funds (3,477)
- CRSP survivorship bias-free mutual fund database, January 1980 until December 2005 (312 months), merged with holdings data from Thomson Financial
- CRSP/Compustat stock-level database:
  return, market capitalization, book-to-market, momentum, liquidity, SUE
- Recessions: NBER dates (38 months)
  Alternatives: months with 1) highest 12% cash-flow volatility; 2) negative real consumption growth; 3) lowest 25% market returns; 4) real-time recession probability.

Main Result: Timing and Picking Skills are Cyclical

- Main insight: Information allows an investor to purchase more of an asset when its return is likely to be high. It determines covariance of investment positions (w's) with returns.
- Two measures of skill:
  - Fund with high $Picking_t^j$ ability overweights assets that have subsequently high idiosyncratic returns
  - Fund with high $Timing_t^j$ ability overweights assets that have high betas before the market return rises
- Define:

$$Picking_t^j = \sum_{i=1}^{N^j} (w_{it}^j - w_{it}^m)(R_{t+1}^i - \beta_i R_{t+1}^m)$$

$$Timing_t^j = \sum_{i=1}^{N^j} (w_{it}^j - w_{it}^m)(\beta_{i,t} R_{t+1}^m)$$

Main result: ↓ Picking and ↑ Timing in Recessions

$$Picking_t^j = a_0 + a_1 Recession_t + \mathbf{a_2 X_t^j} + \epsilon_t^j, \quad (1)$$

$$Timing_t^j = b_0 + b_1 Recession_t + \mathbf{b_2 X_t^j} + \varepsilon_t^j, \quad (2)$$

	Timing		Picking	
Recession	0.140	0.139	-0.144	-0.146
	(0.070)	(0.068)	(0.047)	(0.047)
Constant	0.007	0.007	-0.010	-0.010
	(0.024)	(0.024)	(0.018)	(0.018)
Controls	N	Y	N	Y
Observations	221,306	221,306	221,306	221,306

Control variables: Log(Age), Log(Assets), Expenses, Turnover, Flow, Load, Style measures (size, value, momentum)

Timing is 1.67% points per year higher in recessions than in expansions. *Picking* is 1.75% per year lower in recessions.

Alternative Measures of Recessions

- NBER recession defined ex post: might be problematic to use as an out-of-sample predictor
- Use two alternative measures of recessions available in real time:
  (1) Real-Time probability of recession of Chauvet and Piger (RT)
  (2) Chicago Fed National Activity Index (CFNAI)

	Timing		Picking	
RT	0.004		-0.002	
	(0.002)		(0.001)	
CFNAI		0.094		-0.059
	(0.070)	(0.058)		(0.029)
Constant	0.019	0.019	-0.022	-0.022
	(0.024)	(0.024)	(0.017)	(0.017)
Controls	Y	Y	Y	Y
Observations	221,292	221,292	221,292	221,292

Not All Managers Have Skill

Recession effect at top percentiles of *Timing* and *Picking* distribution:

	P50	P75	P95	P50	P75	P95
		Timing			Picking	
Recession	0.059	0.114	0.251	-0.084	-0.091	-0.173
	(0.023)	(0.041)	(0.082)	(0.021)	(0.022)	(0.067)
Constant	0.000	0.108	0.765	-0.015	0.126	0.722
	(0.004)	(0.020)	(0.061)	(0.005)	(0.013)	(0.053)
Controls	Y	Y	Y	Y	Y	Y
Observations	221,306	221,306	221,306	221,306	221,306	221,306

Effect of *Recession* on *Timing* for extremely successful managers is about four times larger than that for the median manager, a (return) difference of 2.3% per year.

Effect on *Picking* doubles.

Same Managers?

Select funds with highest 25% $Picking_t^j$ in expansions (Skill Picking=1):

	Timing		Picking	
	Expansion	Recession	Expansion	Recession
Skill Picking	-0.001	0.037	0.059	-0.054
	(0.004)	(0.013)	(0.005)	(0.017)
Constant	0.018	0.055	-0.022	-0.159
	(0.001)	(0.005)	(0.002)	(0.006)
Controls	Y	Y	Y	Y
Observations	204,311	18,354	204,311	18,354

Skilled managers switch strategies.

Funds that switch strategies earn higher returns

	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Skill Picking	0.068	0.040	0.058
	(0.028)	(0.018)	(0.016)
Constant	0.058	0.041	0.050
	(0.020)	(0.016)	(0.019)
Controls	Y	Y	Y
Observations	226,769	226,769	226,769

CAPM, three-factor, and four-factor alphas are 48 to 82 basis points per year higher for the *Skill Picking* portfolio, a difference that is statistically and economically significant.

Other results

- **Characteristics of skilled funds**: younger, smaller AUM, higher expense ratios, higher portfolio turnover, higher inflows, fewer stocks, more industry concentration, managers more likely to have an MBA, more likely to depart for hedge funds later
- **How improve timing ability**: hold more cash, hold more low-beta stocks, hold less-cyclical industries before downturn
- **Ruling out alternative explanations**: Composition effects at the fund or manager level, career concerns, mechanical effects at stock level

Skill Index Predicts Future Performance

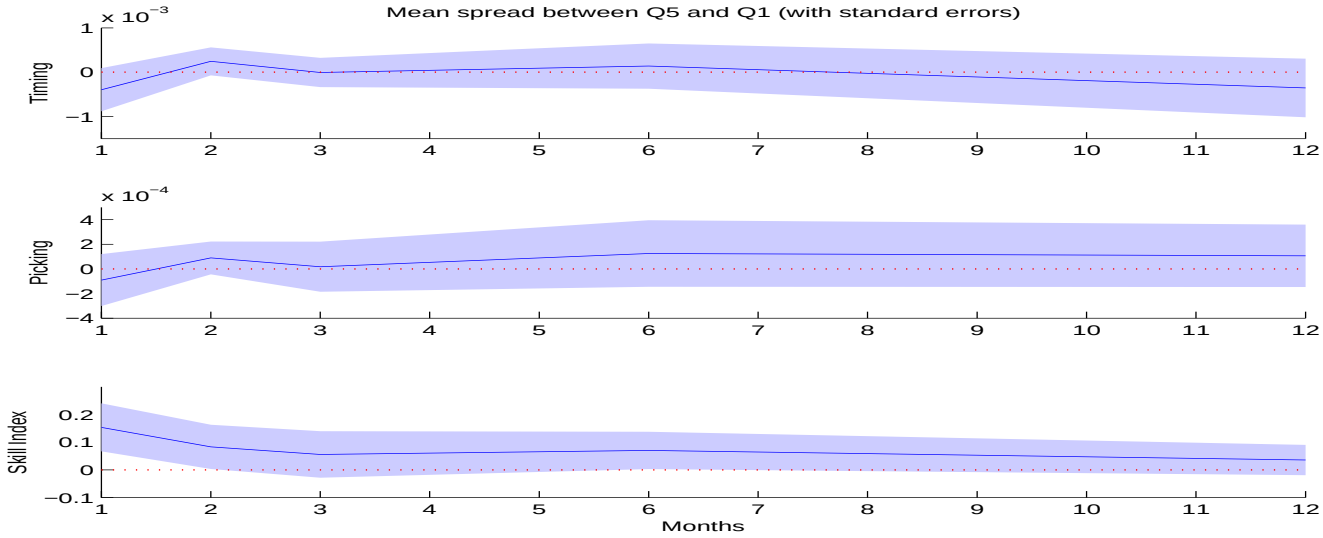
$$Skill\ Index^{j}_{t+1} = w_t Timing^{j}_{t} + (1 - w_t) Picking^{j}_{t}$$

with w_t real-time recession probability

	One Year Ahead		
	CAPM Alpha	3-Factor Alpha	4-Factor Alpha
Skill Index	0.197	0.090	0.091
	(0.028)	(0.023)	(0.013)
Constant	-0.044	-0.071	-0.058
	(0.024)	(0.018)	(0.021)
Controls	Y	Y	Y
Observations	187,659	187,659	187,659

Real-time skill index forecasts fund performance (net alpha) over next year. A one-standard-deviation increase in the *Skill Index* is associated with a 2.2% per year higher CAPM alpha and 1.0% higher three-factor and four-factor alphas.

Persistence of Skill Measures



Model

- Three groups of mean-variance investors: skilled funds (information processing capacity K), unskilled funds (K=0), unskilled non-fund investors (K=0)
- Stock payoffs load on aggregate component $a \sim N(0, \sigma_a)$ and have stock specific-component $s_i \sim N(0, \sigma_i)$ for each stock i
- Timing:

Time 1 Skilled funds choose what to research/allocate attention: choose the precision of signals they will receive about a and s_i's subject to constraint on total capacity K

Time 2 Skilled funds observe signals, update beliefs using Bayes' law, then choose how much of each asset to hold; equilibrium prices are formed from all investors' asset demands and noisy supply

Time 3 Asset payoffs and utilities are realized; model ends

- Recessions are periods with more aggregate risk $\sigma_a(R) > \sigma_a(E)$ and a higher price of risk $\rho(R) > \rho(E)$

Theoretical Predictions

- An increase in aggregate risk or in risk aversion increases the marginal value of reallocating capacity from the stock-specific to the aggregate shock
- An increase in aggregate risk increases the dispersion across funds' portfolios and profits
- An increase in aggregate risk increases the expected profit of an informed fund

Additional Testable Implications

- Actively managed mutual funds should learn more about fundamental aggregate shocks in recessions, and fundamental stock-specific shocks in expansions.
  - $Fpicking_t^j$: covariance between $w_{ti}^j - w_{ti}^m$ and standardized unexpected earnings across all stocks i held by fund j
  - $Ftiming_t^j$: covariance between $w_{ti}^j - w_{ti}^m$ and innovations in industrial production growth (or employment growth)
- Higher portfolio dispersion $= \sum_{i=1}^{N} (w_i^j - w_i^m)^2$ in recessions, also higher dispersion in returns, betas, and alphas
- Higher outperformance in recessions
- All of these are confirmed in the mutual fund data

Conclusion

- Model of attention allocation of investment managers
  3 testable predictions:
  1. **Attention:** Higher covariance between holdings and
     - aggregate information in recessions (*Timing*)
     - stock-specific information in expansions (*Picking*)
  2. **Dispersion:** Higher portfolio dispersion in recessions
  3. **Outperformance:** Higher excess returns in recessions
- Identify group of managers with timing ability in recessions and stock-picking ability in expansions; significant outperformance
- Broader contribution: Uncover evidence that agents actively reallocate attention, in a rational way.