Expansion of ETFs and Alpha Discovery in the Mutual Fund Industry

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November, 2014

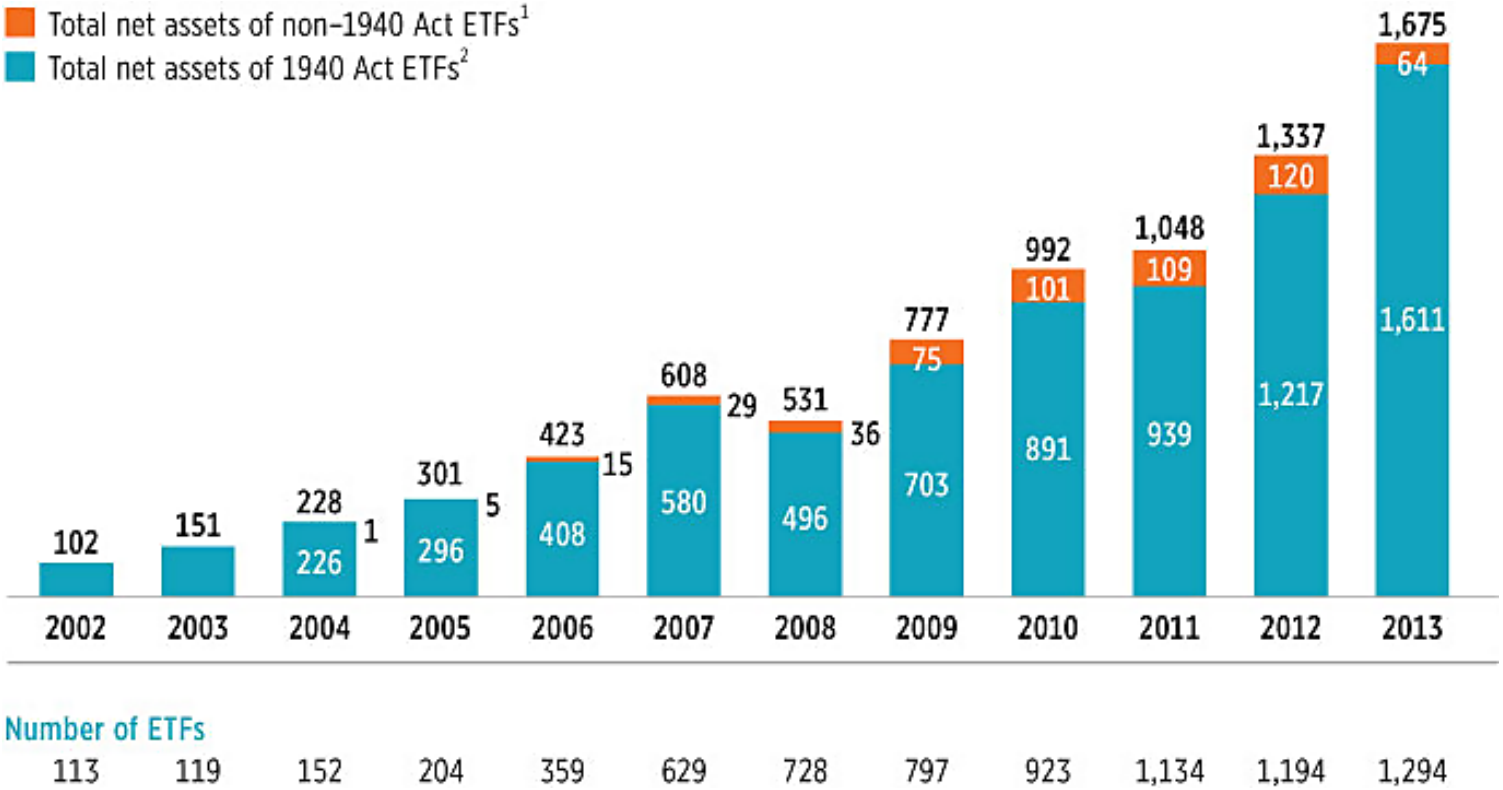
Idea

- Exchange traded funds (ETFs) are more and more common
- How this impacts alpha for the rest of mutual funds?
- Cons: more competition reduces ability to generate alpha
- Pros: smaller funds are better at investing
- So the impact on alpha is indeterminate

Results

- Significant *increase* in alpha for smaller funds after ETF expansion (approximately 6bp annual increase in alpha for every $100 bln. ETF expansion)
- This effect is stronger for the funds that have low R^2 in Fama-French-Carhart time series regression
- No significant effect for larger funds
- The effect still survives if we consider flows into "most correlated" ETF
- Fund fees go down with ETF expansion (almost trivial) — more than the time trend predicts though
- Fund flows go down (almost trivial) — more than competition predicts
- Volatility of funds' returns and alphas increase

ETF growth (ICI Fact Book)



Top-10 ETF funds as of September 2013

Symbol	Name	AUM	Avg Volume
SPY	SPDR S&P 500	$142,986.8 M	109,482,570
VWO	Emerging Markets ETF	$50,893.6 M	19,411,109
EFA	iShares MSCI EAFE ETF	$45,493.3 M	15,279,061
IVV	Core S&P 500 ETF	$44,279.7 M	4,312,735
EEM	iShares MSCI Emerging Markets ETF	$42,342.7 M	64,859,508
GLD	SPDR Gold Trust	$37,638.1 M	9,217,997
QQQ	QQQ	$37,315.6 M	26,544,412
VTI	Total Stock Market ETF	$33,620.9 M	2,284,088
IWM	iShares Russell 2000 ETF	$25,496.2 M	32,884,488
IWF	iShares Russell 1000 Growth ETF	$19,788.6 M	1,791,653

Source: ETF database

Literature

- Mutual fund return predictability: Lou (2012 RFS), Lou and Polk (2013)
- ETFs and stock correlations: Wurgler and Zhuravskaya (2002 JoB), Greenwood (2008 RFS), Hamm (2011), Da and Shive (2013)
- Pricing of ETFs: Engle and Sarkar (2002), Petajisto (2011)
- Theoretical equilibrium models: Berk and Green (2004 JPE)
- Mutual fund performance and reduction in alpha with size: Pastor, Stambaugh and Taylor (2014)

Data

- Monthly returns and fund characteristics are from Center for Research in Security Prices (CRSP) Survivor-Bias Free U.S. Mutual Fund Database
- Fama-French and momentum factors
- Time period is January 1981 — December 2012 (384 months)
- ≈12700 diversified domestic U.S. mutual funds (more than $10 mln. in 2012 dollars), ≈985000 fund-month observations
- Sample means:
  - Mean unadjusted before-fees return equals to 8.5% per year
  - risk-adjusted before-fees performance is 7bp
  - after-fees performance is -87 bp

ETFs

- 764 ETFs starting from 1998 (only equity, only close-to-diversified)
- Especially fast expansion from 2004
- 611 of them are index funds
- Median size of $122 mln.
- Very skewed: large funds attract up to $123 bln. (SPDR S&P 500)
- Next one is $75 bln.

Hypothesis

- (**Competition**): ETFs attract investors who would otherwise invest with mutual funds (assumed, not tested)
- **Size curse reversed**: Lower fund inflows lead to higher alpha
  - This only impacts smaller funds
- The result "weakly survives" when I consider "the closest" (most correlated) ETF
- ETF expansion leads to higher volatility of returns of other funds
- Costs and fund flows decrease (almost trivial)

Methodology

- F-F-C alpha: regress *gross* returns (corrected for fees)

$$r_{jt} - rf_t = \alpha_j + \beta_{Mkt,j} Mkt_t + \beta_{SMB,j} SMB_t +$$

$$+ \beta_{HML,j} HML_t + \beta_{Mom,j} Mom_t + \epsilon_{it}$$

- Risk-adjusted return (alpha):

$$\alpha_{jt} = r_{jt} - rf_t - \beta_{Mkt,j,t-1} Mkt_t - \beta_{SMB,j,t-1} SMB_t -$$

$$- \beta_{HML,j,t-1} HML_t - \beta_{Mom,j,t-1} Mom_t$$

Form portfolios

- In order to create more variability in betas fo Fama-McBeth test I sort funds into 25 size-weighted portfolios
- . . . based on size, past returns or both
- There are 132 funds in a portfolio, on average
- First stage: estimate

$$r_{jt} - rf_t = const + \beta_{Mkt} Mkt_t + \beta_{SMB} SMB_t + \beta_{HML} HML_t +$$

$$+ \beta_{Mom} Mom_t + \beta_{ETF} \ln(size_t(ETF) + 1) + \epsilon_t$$

- I try to see if there is any relation between *total* ETF size and alpha
- Second stage: cross-section of portfolios' returns

$$\overline{R_{it} - Rf_t} = \lambda_{Mkt} \beta_{Mkt,j} + \lambda_{SMB} \beta_{SMB,j} + \lambda_{HML} \beta_{HML,j} +$$

$$+ \lambda_{Mom} \beta_{Mom,j} + \lambda_{ETF} \beta_{ETF,j} + \eta_j$$

Results

Cross-sectional fit

	CAPM	Fama-French	F-F-C	Model 3
λ_{Mkt}	$0,99\%^{***}$ (0,28%)	$0,84\%^{***}$ (0,27%)	$0,90\%^{***}$ (0,26%)	$0,90\%^{***}$ (0,26%)
λ_{SMB}		$0,43\%^{*}$ (0,26%)	$0,23\%$ (0,29%)	$0,22\%$ (0,30%)
λ_{HML}		$-1,51\%^{**}$ (0,59%)	$-0,88\%^{**}$ (0,45%)	$-0,89\%^{**}$ (0,45%)
λ_{UMD}			$0,79\%^{*}$ (0,47%)	$0,79\%^{*}$ (0,48%)
λ_{ETF}				$0,034\%$ (0,024%)
J_{FM} $P-value$	51,02 0,0016	71,54 0,0001	42,38 0,0164	41,52 0.0178

Results for smaller portfolios

Cross-sectional fit

	CAPM	Fama-French	F-F-C	Model 3
λ_{Mkt}	$0,99\%^{***}$ (0,28%)	$0,84\%^{***}$ (0,27%)	$0,90\%^{***}$ (0,26%)	$0,90\%^{***}$ (0,26%)
λ_{SMB}		$0,43\%^{*}$ (0,26%)	$0,23\%$ (0,29%)	$0,22\%$ (0,30%)
λ_{HML}		$-1,51\%^{**}$ (0,59%)	$-0,88\%^{**}$ (0,45%)	$-0,89\%^{**}$ (0,45%)
λ_{UMD}			$0,79\%^{*}$ (0,47%)	$0,79\%^{*}$ (0,48%)
$\lambda_{Large,ETF}$				$0,021\%$ (0,023%)
$\lambda_{Small,ETF}$				$0,047\%*$ (0,032%)
J_{FM} $P-value$	51,02 0,0016	71,54 0,0001	42,38 0,0164	40,52 0.0181

Most correlated ETF

- This is a weaker approach
- I find the closest ETF to every mutual fund in the sample (based on past 2 years of monthly returns)
- Compute correlation between change in (annual) alpha and this ETF (precentage) inflows

Results

Average correlation of ETF inflows and alpha change

	Correlation	Std. dev.
Size 1 (largest)	-0,03	0.04
Size 2	0.00	0.07
Size 3	0.02	0.05
Size 4	0.03*	0.02
Size 5 (lowest)	0.05*	0.03

What's going on here?

- Significant *increase* in alpha for smaller funds after ETF expansion
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Conclusion

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